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THE FIRE PROTECTION OF THE U. S. FOREST SERVICE

By Agnes C. Laut

IT would be hard to exaggerate the service performed by the United States Forest Rangers in preventing and fighting fires in the National forests. Imagine a domain as long as from Canada to Mexico, as wide as the Rocky Mountains, as intricate and criss-crossed and tangled in growth as a thicket, sometimes sheer on the perpendicular, always from August to November as dry as cork or tinder, and often raked by hurricane winds that acquire the capricious force of a tornado in the mountain canyons and on the vast upper plateaux—and you have some idea of the Forest Rangers' duties as fire patrol in the National forests!

In Germany and France, a fire ranger seldom patrols more than 1,500 or 1,000 acres; and his area is literally a cob-web of old paths through clear park-like forests, that have been cleaned up from time immemorial. In the United States, some men have under their patrol as many as 300,000 acres; and few have less than 100,000 acres; and when the U. S. Rangers began work, there was practically not a road, trail, or path of any sort—excepting only game trails to watering pools—through all their vast domain. In the Southwest, or yellow pine forests of the desert—in Utah, New Mexico, Arizona and parts of California—though the trees grow mast-high and are clear of underbrush below as European parks; yet the climate is so dry, the carpet of pine needles underneath so inflammable, and the resin running from gashes in the tree trunks so dangerous in fire, that the peril is almost as great as in the thickly-grown heavy spruce and hemlock and fir forests of the Pacific Northwestern States, where a man is literally neck deep in ferns, under branches that shut out daylight, in wind fall, where single trees out of which you could build one six room cottage lie criss-crossed and piled in impassable confusion.

At a distance, fire patrol work seems about as adventurous and romantic a kind of life in the great out-door world as a young man could choose. Out on the spot, it is romantic and adventurous enough; but the hard labor is of a kind that a convict would shun. I have ridden through forests of the Pacific Northwestern States where it was easier to chop a way through under a fallen trunk for yourself and your horse than attempt to go round or climb over. In other places, you come to the edge of a precipice, where the trail jumps off into nowhere. On this precipice imagine a pall of smoke lying so thick that to see the length of your own horse you have to fan a way ahead with your hat. If your horse knows mountain trails, you hang on with your knees, give him his head, and slither down somehow. If he doesn't know to fall on all fours, you get off and crawl down as best you can, letting him follow. You may have to follow this kind of trail through smoke for twenty miles. That's what fire patrol work means. It's adventurous and romantic all right; but out on the spot, it sometimes has the flavor of smoked herring.

"We lay hemmed in this valley for three weeks last summer with the smoke so thick you could not see beyond the piazza," said the mother of

CONSTRUCTING A FIRE LANE IN THE HELENA NATIONAL FOREST, MONTANA.

a Forest Ranger to me, up at the 10,000 foot level in the blue spruce forests of Colorado.

"You see the National forests join on the public domain just over the divide. A spark from the locomotive had set fire to the public domain—there was no one to fight it—the boys were out on patrol along the bounds of the National forests; and whenever the wind came down over the divide, the smoke came down like clouds of lead or burning blankets. We could not see a thing. We had to keep the lamps lighted at mid-day; and at night, up on the divide, it looked as if the very atmosphere were in flames. Of course, we couldn't leave. We couldn't have left if we had wanted to—the tracks were burned, and the fire ran across all the trails out. For three weeks the boys slept in their boots. They had cut a fire guard along the forest bounds, when they saw the fire coming up the divide; and they strung their patrol out along this fire-break. Wherever a spark swept across, or cinders fell—they sprang at it with mattocks and wet bags and put it out. Only the fact that the wind loses its fearful force up here saved us. Then, you know, we are just about cloud line here. Though very little rain falls till after September, the clouds lie right in this forest like a fog—they blanket everything at nightfall and keep the ground wet as with dew. That and the direction of the wind saved us; but I tell you—they were anxious days. We never knew the moment, day or night, when the red fire line would come up over the ridge of the divide. As you see—we are in a box canyon here—boxed up on all three sides. The railroad tracks had been cut off. If the fire had come over the divide, nothing could have saved us. For three weeks I carried the boys their meals up on the fire line—day and night; and my daughter was hardly off her pony going up and down the mountain with the water bottles."

RESULTS OF WIND AND FIRE IN HEAVY LUMBER. WHITE PINE AND SPRUCE ON UPPER ST. REGIS RIVER NEAR BORAX. LOLO NATIONAL FOREST, MONTANA.

J. T. JARDINE, SPECIAL AGENT U. S. FOREST SERVICE, FIGHTING FIRE WITH A SADDLE BLANKET, WALLOWA NATIONAL FOREST. THIS MIGHT GIVE OUTSIDERS AN IDEA THAT FOREST FIRE FIGHTING IS EASY.

These water bottles, which are an inseparable part of all fire patrol work, are round rubber bags encased in canvas, to be slung on the saddle pommel. Incidentally, it may be mentioned here that the fire patrol of this district cost less than a fifth of a cent an acre. Not a stick of wood was lost off this forest from the fire. The public domain suffered loss variously estimated at from $700,000 to $1,000,000.

Of course, the first work in fire prevention and protection is the construction of trails. Not all the trails and wagon roads through the National forests are constructed by the Rangers. Arrangements are made with water power companies to clear a trail of brushwood and growth, and then grade a rough road along the right of way of their power line for the privilege of right of way. When a lumber company buys the right to a certain timber limit ripe for cutting in the National forests, it is very often given free of charge the heavy timber along certain specified roadways, on condition of constructing a good road. Thousands of miles of good roads have been constructed through the National forests of Colorado and Idaho and Montana and California by such arrangements.

But let the young man applying for a job on the Forest Fire Patrol beware of thinking it all a kid-glove affair—a supervising of other men. There are times when "other men" are not to be had for love or money; and the Forest Ranger, whether a graduate of Yale or Biltmore, must get out with pick and mattock and axe—and hew to the line; or, if needs be, die on the line; or what is worse—fall maimed on the line.

Up in the Pecos, of New Mexico, I know a Ranger who never left the fire line for one second in twenty-six days. Finally, more dead than alive from exhaustion, without authority from headquarters, he called on some Mexican peons to join the fire fight. For this

GENERAL VIEW OF BURNED DISTRICT ON UPPER ST. REGIS RIVER. HEAVY WHITE PINE AND SPRUCE TIMBER IN THE VALLEY. EVERY TREE KILLED BY FIRE. LOLO NATIONAL FOREST, MONTANA.

RANGER GRIFFIN MAKING A CLOSE OBSERVATION OF FOREST FIRES FROM THE TOP OF MT. SILCOX LOOKOUT STATION WHILE ON FIRE PATROL DUTY. CABINET NATIONAL FOREST, MONTANA.

risky work he promised them the munificent pay of $1.25 a day. In a week they had the fire mastered. When the Ranger sent his accounts in, they were disallowed—this was before the régime of either Pinchot or Graves—he was told that he had acted without authority, and he was suspended from office. The Mexicans surrounded his cabin and threatened to mob him. Desperate, the young fellow, at his own expense, wired all details to Washington, and demanded an investigation by an inspector. When the inspector came he was vindicated. The accounts were paid, and he was reinstated with a promotion.

It may be added that in these desert forests, the cost of fire protection is so small as to be incalculable. Yet, except for one small fire in the Angeles Forests of California two years ago, not a stick of wood has been lost from the National forests of the desert for more than ten years. Not all red tape as to action in the emergency of a fire is confined to the old régime.

Two years ago, when the worst forest fires that have ever been known in the United States were sweeping Washington and Idaho and Montana, a supervisor, desperate for help, wired to Washington for permission to use the State troops. The Senator of that State, who had a standing quarrel with the Forest Service, wired that the troops were not needed. Within twenty-four hours that Senator's home town and all his personal belongings were wiped out by the sweep of the great forest fire. Also, seventy of the Forest rangers and Wardens had lost their lives.

In laying out the trails with a view to fire protection, the object is twofold: First, to give swift, easy access to some high lookout station from which the Ranger can get a bird's-eye view of his entire domain; second, to give swift, easy access to those parts

FIRE LINE 100 FEET WIDE BUILT BY CARBON TIMBER CO., UNDER DIRECTION OF FOREST OFFICERS, ROUTT COUNTY, HAYDEN NATIONAL FOREST, COLORADO.

of the forest, which offer a natural barrier to an advancing fire, such as a rock canyon, a river, a lake, a bare divide. Once a bad fire has gained headway, the fighters do not attempt to work across its sweep. That would invite defeat through a leap of the flame across the fresh burn. What they do is by a fresh burn, by pick and shovel and mattock, to try to head the fire to a natural break—rock, or a bare slope, or a bare canyon, or a lake. The aim is to have the lookout stations so high and commanding that Rangers miles apart can see across to one another's territory and semaphore help or warning.

We'll suppose a Ranger, sweeping the valley below with his field-glass from such a high lookout, sees something that looks like the beginning of a fire. Is it mist, or cloud, or a traveler's camp-fire? He watches and signals the next station. It signals back. Why doesn't he ride right down? Well, that wisp of cloud above the forest, for all the world like a plume spreading out, may be a hundred miles away; or it may be across an impassable canyon; or it may be blocked off by a precipice. The Ranger goes back to his cabin and he telephones all the stations in his district to be on the lookout that night—for the man nearest to go down and see. The plans are yearly to extend the telephones, not only to the Rangers' houses, but to these lookout stations high on the bare hills. That night, every man in the district will go up to his lookout for a scrutiny of that "suspect" fire. If it's mist, it will disappear at night. If it's fire—ever so small a fire—there will be a red glow.

Instantly, all the telephones will be set ringing—fire alarms ring through these high lonely silent forests. If the man nearest has been able to reach the fire, he reports to the supervisor, and the supervisor decides whether all the Rangers of that district are needed on the spot, or whether the local men nearest can handle the fire. Sounds simple and effective and easy, doesn't it? But if the fire happens to be fifty miles from the nearest man, and there is no trail, and the forest is a thicket of windfall and pine needles and moss dry as tin-

der, and the wind happens to blow up a gale, that feathering flare of red against the night sky above the inky dark forests may spread out and devastate a hundred miles before "the boys" in Norfolk green go spurring through the trackless black woods at breakneck pace to fight on the fire line.

The fire line is, of course, stretched out under command of the Ranger, or Warden, or Supervisor, who happens to be on the spot. The object is never to fight fire. It is to fight fire with fire—to back fire, and then head the fire up to this or to a natural barrier. The supervisor was doing this down in the Ozarks in March, 1911, in what seemed a very small fire, indeed. It had been burning only two days and one night. Keefer saw it from the lookout tower, near Little Bushy Creek, one night at 6 P. M. He had worked along with his men till about 1 in the morning, heading the fire up to a bluff where there was a natural drop to water. When you have worked under the advancing crest of a fiery wave for seven hours, it isn't surprising you should wish to get down that bluff somehow for a drink of water. None of the men knew exactly where the sharp rock edge of the cliff lay; for the smoke was like a hot red blanket, and the noise of crashing trees and roaring flame confused sense of direction.

Suddenly, the supervisor seemed to drop into an abyss. Unknown to all, they had been working on the very edge of the precipice, and the supervisor had fallen over the cliff, face down, at least thirty feet. The descent was so steep, it took his men half an hour to get down where the body lay. Details of that descent need not be given. The fire was racing above and behind. The men extemporized a cot with saplings and sacks, and got the injured man out on a trail. I forget the details; there were breaks and sprains and internal injuries. It was a thirty-five mile drive to a railroad. So rough was the trail it took seventeen hours to get the injured supervisor across those thirty-five miles. The man was placed in a baggage car and conveyed to the hospital. Here he lay for three months —a mere detail of the Forest Ranger's life.

Next to trail, lookout and semaphore work, the Ranger's system of clean-up is the greatest protection against fire in the National forests. Fire seldom leaps from tree top to tree top. Unless struck by lightning, or blistered by a dry hurricane wind, green tree tops do not offer best lodgment for sparks. The dangerous fire is the one that gets embedded smouldering in the dry depths of pine needles and moss and wind fall. This kind of fire may creep along for days before it is noticed.

A camper's fire not extinguished, a smoker's match tossed into dry brush wood, a chance spark from an engine, a fire set going for spite by some game poacher or cattle thief to cover tracks —from any of these causes, the worst fire may spring, to smoulder undiscovered for days. Then, a dry wind springs up—the sparks are carried forward into brush and wind fall and dry branches and punky stumps, where the lumber men in the old days were not compelled to clean off.

Such swamps of dry confusion have been left on these old areas lumbered off years ago—stump eight feet high, brush wood in such a criss-cross neither man nor horse can travel, piles of dry slabs and sawdust—that if once the fire gets into them, it is hopeless to stop it. All that can be done is to protect the fresh forests by a surrounding back fire. For this reason, under the new régime, all lumbermen operating in the National forests are compelled to observe certain regulations. Stumps may be left only eighteen inches high. Only ripe timber may be cut. The young and the green—nature's protection against fire—must be left untouched. All bark, brush wood and waste must be gathered in neat piles to be burned by the Rangers only during snowfall or rain; and the surface of the cut-off lands must be left clean as a park.

Perhaps no feature of Forestry regulations has created bitterer enmity among small operators—the single saw mill man. The big operator has glad-

ly conformed to the new clean-up regulations—they protect his big limits; but the little man feels himself handicapped in speed. Wages are high. He doesn't want to waste high wages cleaning up for the protection of posterity; and when the young Rangers insist on it, "spite fires" are set going to do the cleaning up.

How the terrible fires of two years ago in Montana, Idaho and Washington began will probably never be known. I have heard some of them ascribed to "spite fires;" others, to hunters' camps; but all were too widespread and scattered for any similar cause. Neither will the heroism of the seventy-three Rangers and Wardens who perished in those fires ever be known. There was no one to witness the bravery of men who stayed on the fire line doing their simple duty, till they perished where they stood. Charred remains were all that told the tale of courageous work; but put the fact down in your memory's note book for future reference, when you hear the Forest Service disparaged!

When you hear of scrubs and quitters and graft-takers and back-biters and small politics among the Rangers, just remember this—I always try to remember it when I hear a certain Forest Service man talk in disparagement of his fellow workers—*in the fires of the Pacific Northwestern States, that one year, more Forest Rangers lost their lives than mounted policemen have perished in the Canadian Northwest in all the history of that service.*

When I hear some fresh and impudent bookful graduate of a Forest school, who cannot tell a cypress from a yew, nor a pine from a fir, proffering pointers to old lumbermen, who have forgotten more woodsy lore than the schools have ever known, I always try to remember that seventy-three men died on the fire line that year without a whimper—that, in fact, the Forest Service had to take up a subscription to bury the charred remains.

Who does not know the story of Pulaski on the Big Creek of St. Jo., a hundred miles from anywhere in the Coeur d'Alene—Pulaski, a nephew of the Polish hero—I shall give the narrative in almost the words of his supervisor—had forty men under him in a V-shaped canyon, where the streams were very shallow and dry. It had been a terribly dry season. There had been scarcely a drop of rain from May to October. The August heat seemed to create hurricane winds, and all through Montana, Idaho and Washington sporadic fires had been springing up, but the Rangers had kept out on the fire line, and the fires seemed to be under control—dying out, or heading above timber line.

A heavy red pall of smoke was seen to be coming up from the southwest, as Pulaski described it—"a sailing mass of smoke and flames resembling a war ship." It began drifting down the creeks and box canyons towards the town of Wallace. A wind storm rose in hurricane. The heat seemed to create a vacuum. Gases generated in the atmosphere that exploded like bombs. The air could be seen in flames above the trees, where there was nothing to burn. Suddenly, the forested slopes of the mountains seemed to go mad. Trees were torn out by the roots. Three of Pulaski's forty men were instantly killed by falling trees as they marched, picks and shovels over shoulders.

Pulaski saw plainly it would be a fight, not to save the forests—nothing could do that—but to save Wallace. Four miles from town, the hurricane of falling trees and fire became so dangerous that the men broke from rank and dashed for the tunnel of the War Eagle Mine. One horse literally burned to death as they all dashed for the tunnel of the mine.

The smoke was so heavy that the men had to lie down on their faces under it in order to breathe. Then, the timbers inside the tunnel of the mine took fire. Pulaski and a helper used their hats and water canteens to put out the flaming timbers. By morning eight of Pulaski's men lying under the smoke were dead. A man had gone raving mad, and would have dashed out of the tunnel into the seething fire. Pulaski, at pistol point, kept

the man in the safety of the tunnel. Wet gunny sacks were wrapped round the heads of the prone men to keep their hair from taking fire.

While Pulaski held his crew in the tunnel, John Bell, of the same district, was out on Big Creek with fifty other men. When they found themselves hemmed with fire, they dashed for safety to the little homestead clearing of Jo Beauchamp—an oasis of two acres along a stream in the midst of the fire circle. The men lay face down in the mud. Trees splintered and fell like breaking matches. Seven men were burned to death, and three men killed in the stream by falling trees.

Northeast of Avery, Idaho, William Rock had seventy or eighty fire fighters at work. When he saw they were completely encircled by fire, he drew his crew around him on a burned off area and waited for rescue. The atmosphere literally took fire. This drove one of the young fire fighters insane; he drew his pistol and shot himself. And with it all was such a hurricane wind, the men could barely stand on their feet, or hang to the ground. One man was tossed out of his saddle.

On Setser Creek twenty-eight men were burned to a crisp on the fire line, and were wrapped in their blankets and buried where they fell. (These fire fighters were being paid at the rate of 25 cents an hour.)

On Stevens Peak nineteen men took refuge in a tiny cabin in the midst of a clearing. The roof fell in. Of the nineteen eighteen perished, and the nineteenth man escaped with all the skin burned off his face.

For a month 1,800 men served on the fire line in this region. The highest pay was 30 cents an hour for temporary bosses; and when the death toll was summed up the Service had to take up a subscription to pay hospital and funeral expenses. Such is life on the fire line!

NATIONAL FOREST RECEIPTS FOR GOOD ROADS

SECRETARY HOUSTON, of the Department of Agriculture, says that the State and Federal Governments should work together for highway improvement in order that a large proportion of the money annually spent for road construction may not be wasted. In his own department the office of public roads has been demonstrating the value of proper road building by the construction of certain object-lesson roads, and the forest service is carrying out his idea of national and State co-operation in road building. The law requires that ten per cent of the gross receipts from the national forests shall be spent in the States in which the forests are situated. This money is expended for road improvement under direct control of the Secretary of Agriculture. The amount appropriated under this act, based on the receipts of the national forests for the fiscal year ending June 30, 1913, is $234,638.68. From the 1912 receipts for this ten per cent road item, there is an additional $134,831.10, which is still available.

In administering the ten per cent road fund, forest officers charged with the actual plans and expenditures in the neighborhood of their forests have, in almost all cases, secured an equal or a larger co-operative fund from State authorities for the building of certain pieces of road.

With the money thus expended many important roads are being built or put in repair. One on the Wyoming national forest, six miles long, makes accessible to farmers a large body of timber and opens up a region of great scenic beauty. In northwestern Arizona, part of the fund will be used in connection with the LeFevre-Bright Angel road, important because it makes accessible to tourists the Grand Canyon of the Colorado. In one place the Ocean to Ocean Highway crosses the Apache National Forest, Arizona, and on this project the Forest Service and the local authorities cooperated enthusiastically. On the Florida National Forest in western Florida steel bridges and graded roads have, under the stimulus of this fund, taken the place of corduroy, bog, and sand.

DEVELOPMENT OF FIRE PROTECTION IN THE STATES

By J. Girvin Peters, *in Charge of State Co-operation, Forest Service*

BY far the most important forest problem with which the States are concerned is that of fire protection. The damage from fire has been tremendous. Forest fires in the United States have caused an average annual loss of about 70 human lives, the burning over of approximately 10,000,000 acres, the direct destruction of timber worth at least $25,000,000, and other indirect losses of many millions. Only within the past few years has real progress been made in meeting the fire danger.

The Federal Government is protecting, as far as its resources will permit, a net area of 165,000,000 acres, which is about six times the size of Pennsylvania. Twenty States are protecting their own lands and those of private owners, amounting to approximately 100,000,000 acres. Thirty timber owners' associations, from Maine to California, are protecting about 25,000,000 acres.

In 1912, as a result of organized protection on approximately 300,000,000 acres, the loss on the National Forests was kept down to $75,000, and on State and private lands to less than $200,000.

The value of timber is constantly increasing, and the protection of the forest is necessary to the permanency of the lumber industry. It is significant that many States whose forest work was begun mainly along experimental and investigative lines are now giving the larger part of their time and their appropriation for forestry to fire protection. Most of the States which more recently have inaugurated forest work give practically all their attention to fire protection.

APPROPRIATIONS FOR PROTECTION.

The importance which various States attach to the fire problem may be judged best by the increase of the funds appropriated, together with the tendency to elevate the protective organization from one of mere fire-fighting to one of actual fire prevention. Since the disastrous fires of 1908 in the Northeast, Maine has increased its annual appropriation from $10,000 to nearly $70,000; New Hampshire, from nothing to almost $20,000; Massachusetts, $5,000 to $25,000; Connecticut, nothing to $5,000; New York, $20,000 to $75,000; New Jersey, $7,500 to $15,000; Pennsylvania, from nothing to $25,000 (for protection outside of the State forest preserves), and Maryland, nothing to $5,000.

Since the terrible fires of 1910 in the Lake States and the Pacific Northwest, Wisconsin has increased its annual appropriation from nothing to $35,000; Minnesota, $15,000 to $75,000; Washington, $22,000 to $38,000, and Oregon, nothing to $25,000.

The Federal Government by the Act of March 1, 1911 (Weeks Law), appropriated $200,000 for co-operation with States in protecting forests on the watersheds of navigable streams. This fund, which is available until the fiscal year ending June 30, 1915, has been supplemented by an appropriation for the fiscal year ending June 30, 1914, of $75,000.

The States which have taken the lead in adopting measures for the prevention and control of forest fires have passed laws which provide primarily for (1) a protective system, (2) the removal of the causes of fire and decrease of the fire hazard, and (3) an appropriation of funds.

Some States have authorized the establishment of a protective system but have made no provision for its support. In consequence the fire laws are practically inoperative. Yet the expenditure for a protective organization would

amount, in the long run, to considerably less than that for fighting fires. At the same time, loss of life and tremendous damage to property would be prevented.

PROTECTIVE SYSTEM.

The chief objects of a protective system are to prevent fire, to discover promptly and locate accurately fires which may start, and to reach them quickly with an adequate force of men. These objects are attained through the influencing of public opinion, through the efficient administration of forest fire laws, and through co-operation with all protective agencies. There must be thorough preparation in advance for emergencies.

The State fire officers go out among the people to warn them of the danger of fires and to secure the good will of all, they apprehend offenders against the law and, if possible, make examples of them through conviction. It is possible to so educate the public that the situation can be handled successfully without having to call upon the penalty of the law. Experience has demonstrated, too, that unless an active, efficient organization exists laws are not vigorously enforced.

THIS PERTINENTLY ASKS IF CARELESSNESS SHOULD LIGHT A TORCH TO DESTROY REVENUE FROM FOREST INDUSTRY.

PERSONAL.

The better organized systems have a State forester or a similar officer as ex-officio State fire warden. Under him there are district fire wardens, each in charge of one of the fire districts into which the State may be divided; lookout watchmen on elevations from which fires may be quickly discovered; patrolmen or rangers, who cover the country below; foremen of fire crews; and helpers summoned to fight fires. The district wardens, watchmen, and patrolmen constitute the preventive force; the foremen and helpers, the fire-fighting force. This division of the organization into preventive and fighting forces is entirely arbitrary, for frequently the work of both overlaps. Some States have the complete organization; some lack the preventive force; and others have no chief fire wardens, the system being organized by the individual county or township.

Cooperation among the members of the organization and between them and all other protective agencies, including the general public, is essential. The greater the amount of cooperation secured, especially that which is voluntary, the greater is the organization's influence in the State, the more far-reaching and effective the protection, and the lower its cost.

THE PRINCIPAL SYSTEMS.

The protective systems may be divided into two broad classes, (1) those under a State fire warden or similar officer, and (2) those under the individual county or township governments and in no way responsible to a State officer.

Class 1 comprises (a) Systems paid wholly or in part by the State. In most cases the State bears practically all the cost of preventing fires, and in many cases shares the cost of fighting them. Systems of this kind have been provided for by Maine (in the Maine Forestry District), New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York (in the Adiron-

DANGER!
DESTRUCTION OF
Homes and Resources
BY FOREST FIRES
IS A LOSS TO THE
ENTIRE COMMUNITY
YOU SHARE IT
$400,000.00
A DAY
IS DISTRIBUTED IN THE
PACIFIC COAST STATES
BY FOREST INDUSTRY
FOREST PROTECTION
IS
PROSPERITY INSURANCE
BE CAREFUL WITH FIRE
WESTERN FORESTRY AND CONSERVATION ASSOCIATION, PORTLAND, ORE.

dack and Catskill mountain regions), New Jersey, Pennsylvania, West Virginia, Maryland, Kentucky, Tennessee,[1], [2] Louisiana,[3] Michigan[1] (north of township 20 north), Wisconsin, Minnesota, South Dakota, Montana, Idaho, Washington, and Oregon.

(b) Systems paid by the township, the county, or private owners. Actual fire fighting as contrasted with fire prevention is the sole object. Such systems have been provided for by Delaware,[3] North Carolina,[3] Alabama,[1] Colorado, and California.

Class 2 systems are organized and paid for by the individual town or county. The State is not required to give any supervision or aid whatsoever. Systems of this kind have been authorized by Maine (outside of the Maine Forestry District), New York (outside of the Adirondack and Catskill mountain regions), South Carolina, Ohio, Indiana, Michigan (outside of fire districts), and Utah.

PROTECTIVE IMPROVEMENTS.

Protective improvements are an essential feature of all effective fire plans. Attention is being given to the construction of lookout stations, telephone lines, roads, trails, fire lines, patrolmen's cabins, tool boxes, and other improvements, with the view of making the forest accessible and preparing in advance for the control of fires. Lookout stations permit quick discovery of fires; telephone lines assure prompt notification of their occurrence, and the advantageous handling of fire fighters; roads and trails make easy the rapid transportation of fire fighters and supplies; and fire lines render more effective the control of fires. Funds invested for improvements of this kind furnish a cheap insurance.

Practically all the States which have established paid fire protective systems have made a beginning at least in constructing such improvements, while some have spent large sums and made considerable progress in the work. During wet periods when there is little danger from fires, patrolmen or other members of the force are often assigned to this construction work, and thus in some States the extension of the plan of improvements has been rapid.

REMOVAL OF CAUSES OF FIRE, AND SIMILAR MEASURES.

The protective systems are charged with the administration of laws prescribing various fire preventive measures and, usually, penalties for their violation. The first laws of this kind enacted were those providing penalties for the wilful or negligent setting of fire on another's property and making the person who set the fire liable for damages. Practically all the States have such laws, some of which date back to the period of the American Revolution, and remain today as the only forest fire laws on the statute books of the State. Other early laws include those requiring notification to the owners of adjoining land before setting fire on one's own land, the extinguishment of camp fires before leaving them, and later, with the coming of the railroads, laws requiring devices to prevent the escape of sparks or fire from locomotives, and the clearing of inflammable material from the right of way. Only within the last decade, however, has real progress been made in the enactment of forest fire laws and their enforcement through the agency of paid organizations.

RAILROAD REQUIREMENTS.

There has been much restrictive legislation to prevent the start or spread of fires from railroads. All railroad fires are not caused by locomotive sparks; many start from the cleanings of ashpans and fire boxes, from lighted matches and smoking materials thrown from car windows, from the careless use of fire by persons walking along the tracks, and from other causes.

[1] Fire protective system consolidated with fish and game department.
[2] Expenses paid from revenue from fish and game licenses and penalties.
[3] Not organized to date.

Many railroads are showing an admirable spirit of cooperation with State and Federal authorities in the adoption of methods to prevent fire, whether required by law or not. The price of timber is constantly increasing and large damages may be claimed from its loss; in addition, there is the consequent loss of freightage in lumber or other forest products which the timber would eventually have supplied. Precautions adopted voluntarily by some railroads during dangerous seasons include, for example, the use of oil-burning locomotives, the nailing down or the screening of smoking-car windows, and the installation at routage points of a fire service consisting of one or more freight cars carrying water tanks, a high pressure pump, and lengths of hose—an outfit which can be run to a fire quickly and which might save large damage payments.

The first laws designed to give protection from railroad fires had in view primarily to reduce the causes of fire and decrease the hazard. While precautions of this kind may aid materially in such protection, it will generally be found necessary to supplement them by a patrol of the right-of-way where it passes through forest lands. So great has been the loss from railroad fires in some sections that these precautions, including patrol, have been considered inadequate, and there is a constantly increasing sentiment to require the use of electricity or oil, although no State has yet required the use of electricity.

So difficult has it been in many instances to prove that fires which started on or near the right-of-way were set by the railroad that States are beginning to place the burden of proof on the company to show that it did not start the fire. As a matter of interest in this connection, it may be stated that a provision is inserted in all contracts which grant rights-of-way through the National Forests placing the burden of proof on railroad companies to show that they did not start fires discovered burning on or within a specified distance of the right-of-way, equivalent to about 300 feet from the railroad track. A similar provision has recently been adopted by the Canadian Board of Railway Commisioners.

STOP

You Are Interested In This Notice. Read It.

You can help save California millions of dollars yearly by being careful in the use of fire. Remember that for every 1000 feet of timber burned it means a loss to you and the community of over $8.00 while the owner's loss will be $1 or $2.

Observe The Following Rules

Never to burn brush, grass or slashings during the dry season without a permit from the fire warden. Never leave a camp fire until it is out. Don toss away any matches or tobacco. Don't make a camp fire in leaves, rotten wood or against a log—keep a clear space around your fire. If you find a fire put it out if you can, if not, notify a Fire Warden or State Forester at once. Care with small fires means few large ones. Be as careful with fire when out in the forests, as you would be in your own home

The Law and Good Citizenship Require Observance of These Rules. HELP ENFORCE THEM

Redwood Fire & Protective Association

Fort Bragg, California

In at least one State, Virginia, the law specifically provides that railroads shall be liable for damage resulting from fires started by sparks or coal thrown or dropped from the locomotive or train, whether or not the locomotive was equipped with proper spark arresters. The majority of the other States make railroads liable, in general terms, for injuries resulting from fires caused by them, although certain of these States confine the liability to cases in which due precautions have not been taken. In the remaining States the railroads are liable under the common law.

The use of oil-burning locomotives is required by only one State, New York, but only in the Adirondack Forest Reserve. A number of States require the use of devices to prevent the escape of fire from the stacks and ash pans of locomotives burning coal or wood. In some States these devices must be approved by the public utilities or railroad commissions; the railroads

HELP SAVE THE FORESTS

AN $800,000.00 LOSS

By forest fires in Massachusetts the last two years.

YOU SHARE IT

MATCHES + CARELESSNESS = FOREST FIRES

REMEMBER THIS WHEN ON YOUR VACATION

You can help — join this Association.

MASSACHUSETTS FORESTRY ASSOCIATION

4 Joy St., Boston *Write for Pamphlets*

THE MASSACHUSETTS FORESTRY ASSOCIATION
INCORPORATED 1898

THIS PLACARD, WHICH IS LARGE AND STRIKING, MAY BE FOUND POSTED ALL OVER MASSACHUSETTS. IT IS DISTRIBUTED BY THE MASSACHUSETTS FORESTRY ASSOCIATION.

THIS IS A REPRODUCTION OF AN ATTENTION-COMPELLING ILLUSTRATION ON A CIRCULAR, FIFTEEN HUNDRED THOUSAND OF WHICH HAVE BEEN DISTRIBUTED IN PENNSYLVANIA.

The idea was adopted from a circular designed by E. T. Allen, of the Western Forestry and Conservation Association, to interest school children in forest fire protective work. The circulars used in Pennsylvania were issued by the Pennsylvania Forestry Association, the Pennsylvania Conservation Association, the Philadelphia Commercial Museum and the Lehigh University. Four hundred and fifty thousand circulars with similar illustrations have been distributed in Massachusetts and several hundred thousand in North Carolina.

are required to inspect the devices and maintain them in good condition; and the State has the authority to enjoin the use of a defective engine until the defects are remedied. Railroad employees are prohibited from depositing fire or live coals on the track or right-of-way in the vicinity of forest lands. One State, Maine, has recently passed a law requiring railroads to screen or fasten down the windows of smoking cars in the "forestry district" during the danger season. As a practical precaution against the spread of fire from the right-of-way, many States have provided that the grass, brush, or other inflammable materials shall be cleared off, during danger seasons, where the road passes through forest lands; and a few States require or authorize an extension of such cleaning by the construction of fire lines or fire breaks at points of danger adjoining the right-of-way.

Measures of this kind have in view the removal of the causes of fire and the reduction of the hazard, and they are frequently supplemented by a patrol of the tracks and right-of-way during such periods as may in the judgment of the State forest department seem necessary, this patrol to be maintained either by the railroad or by the department itself, which is provided the means of

Regardless of private ownership of lands on which they stand the forests form the chief asset in our national heritage of natural wealth.

The first long step toward realizing the principles of Conservation WILL ONLY BE TAKEN WHEN OUR FORESTS ARE PROTECTED FROM DESTRUCTION BY FIRE.

State fire patrols are maintained in most timbered regions of the nation, and their prevention of fires HAS SAVED THE PUBLIC MANY TIMES THEIR COST.

California depends upon an unsatisfactory system of volunteer firewardens. A state fire patrol would end OUR ANNUAL MILLION-DOLLAR FIRE LOSS and insure a future timber supply.

HELP TO PREVENT FIRES.

collecting the costs from the company. Employees of the company are required to give notification of the occurrence of fires to section men, station agents and State forest officers, and in a few cases fire signals are required to be sounded from locomotive whistles.

COMPULSORY PRIVATE PATROL.

Oregon passed in 1913 a law requiring every owner of timber land in the State to provide such patrol during the danger season as will be satisfactory to the State board of forestry. If the owner fails to provide the patrol the State forester, under direction from the board, is required to provide it at a cost of not to exceed five cents per acre per annum. All costs to the State for such patrol become a lien upon the property.

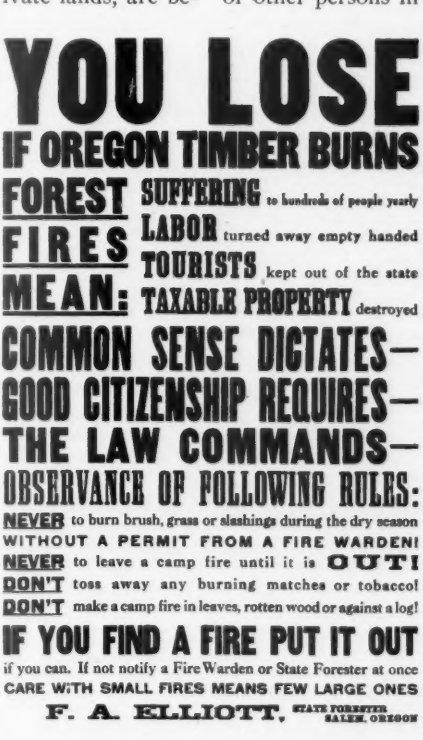
This law will doubtless have the effect desired by those who framed it of encouraging timberland owners to join the protective associations which have been organized in certain counties or to form similar associations in other counties. The associations can under normal conditions of fire hazard establish patrols at considerably less than five cents per acre per annum, the cost which may under the law be incurred by the State.

SLASH DISPOSAL.

Among the most progressive laws are those which deal with the disposal of slash from lumbering—tops, branches, and other inflammable materials, which

constitutes a severe fire menace. Almost invariably, and especially in coniferous forests, lumbering has been followed by fires which started in the slash. Such fires have been regarded as a natural consequence of lumbering and were as a rule expected. Until recently no State had adopted effective measures to get rid of the slash. But States with vast forest areas, which have assumed a large part of the burden of protecting private lands, are beginning to require the owners to leave their lands in a reasonably safe condition after lumbering.

As would naturally be expected, slash disposal legislation has started in the States containing the Northern coniferous forests where fires are likely to sweep up into the tops and kill the trees, causing the destruction of merchantable timber over vast areas, and being frequently accompanied by loss of life. Some States have begun by prescribing a hard and fast method of disposing of slash as, for example, in the Adirondack and Catskill mountain regions of New York, where the lopping of branches from lumbered conifer is required. Others have left the methods of disposal to the judgment of the State forester, as in Minnesota. Since there may be cases where no disposal at all would be necessary or where the methods of disposal should be varied to suit different conditions, there seems to be little doubt that the Minnesota plan will be adopted generally, sometimes the State forest department may not be equipped to handle such inspection work, which may be very extensive if there is much lumbering done.


YOU LOSE
IF OREGON TIMBER BURNS
FOREST FIRES MEAN:
SUFFERING to hundreds of people yearly
LABOR turned away empty handed
TOURISTS kept out of the state
TAXABLE PROPERTY destroyed
COMMON SENSE DICTATES—
GOOD CITIZENSHIP REQUIRES—
THE LAW COMMANDS—
OBSERVANCE OF FOLLOWING RULES:
NEVER to burn brush, grass or slashings during the dry season WITHOUT A PERMIT FROM A FIRE WARDEN!
NEVER to leave a camp fire until it is OUT!
DON'T toss away any burning matches or tobacco!
DON'T make a camp fire in leaves, rotten wood or against a log!
IF YOU FIND A FIRE PUT IT OUT
if you can. If not notify a Fire Warden or State Forester at once
CARE WITH SMALL FIRES MEANS FEW LARGE ONES
F. A. ELLIOTT, STATE FORESTER SALEM, OREGON

BRUSH BURNING.

Closely related to the requirements for slash disposal are those for the burning of brush, grass, and similar materials in or near woodland. The object is to encourage care by farmers or other persons in such burning. The most general requirement is the one prescribing a closed season, which corresponds to the fire season in the State, during which no burning is allowed, unless as in some States a written permit is first secured from a forest officer, or unless the officer himself or his representative is present.

CAMP FIRES.

So much damage has resulted from sportsmen and others leaving camp fires burning in the woods that the absolute extinguishment of such fires is required in in a number of States. Patrolmen help very effectively in the enforcement of this measure by directing persons to camp sites and seeing that they use proper safeguards to prevent the spread of fire.

During dangerously dry periods when the use of fire or fire arms by hunters is likely to cause forest fires a State's Governor may, by proclamation, suspend the open hunting season for such time as he may designate.

UNFENCED STOCK.

In the Southeastern States stock commonly roam at large and the woods are set on fire, at least yearly, under the notion that this improves the forage. As a rule such fires keep to the ground, and while they do not run up into the tops of the larger trees and kill them outright, they hollow out their butts and destroy nearly all the small trees and the young seedlings. Hogs roam the woods and feed on tree seeds and young roots. It has been stated that one fire-spreading man with 20 hogs, 20 sheep, and 10 cows will keep 10,000 acres of longleaf pine land practically devastated.

One State, South Carolina, has enacted a state-wide law making it unlawful to permit stock to run at large. The remaining southeastern States, with the exception of Florida, have passed special acts applying to different counties or districts.

THIS, FROM THE FIRE CIRCULAR FOR SCHOOL CHILDREN, TELLS ITS OWN STORY.

OTHER PROTECTIVE MEASURES.

Other protective measures adopted by various States include the compulsory reporting of fires discovered burning; the extinguishing of fires accidentally set; keeping highways clear of brush; constructing fire-breaks around villages in forest areas; providing against the burning of mill refuse in the open near forest lands, against the liberation of fire balloons, and the destruction of fire warning notices.

CIVIL AND CRIMINAL LIABILITY.

With the exception of a few States, each has provided for civil liability for causing forest fires, and in those which have not there is the usual common-law right to action for damages. Some States allow the recovery of double the amount of damages suffered, if the fire was caused through willfulness or negligence, as distinguished from one of accidental or unavoidable origin.

In addition to the value of property injured or destroyed, three States provide liability for injury to young growth, or to the land and vegetation. Certain States make persons or corporations causing forest fires liable not only for damages but also for the cost of extinguishment. Many of the States give railroads an insurable interest in property along their lines which is exposed to fire damage and allow them to procure insurance upon it for their own protection.

Every State has provided in practically all cases for the imposition of penalties against violators of the forest fire laws.

Moneys collected as such penalties are disposed of in various ways, after the costs of collection have been deducted. As a rule, the fines go into the general fund in the State, county, or township. In some States they are credited to a special fund and used for fire protection only or for general forest purposes. Informers are in some cases allowed half the fine from certain violations.

APPROPRIATION OF FUNDS.

The States which have appropriated or otherwise provided funds for fire protection purposes include the New England States, New York, New Jersey, Pennsylvania, Maryland, West Virginia, Kentucky, Michigan, Wiscon-

sin, Minnesota, South Dakota, Montana, Idaho, Washington, Oregon, and California, 21 States in all. The sums available vary from $1,500 to $75,000 annually, and the total for all the States is about $550,000.

These funds come, as a rule, from general appropriation, although in Maine and Louisiana provision is made for levying a special tax, while in Montana, and to a certain extent in Wisconsin, the cost of protection is paid from the revenue obtained from forest lands owned by the State, with a view of making the protective system self-supporting. The tax has been resorted to only where State funds are insufficient.

The amount of an appropriation, though large in the aggregate, is by no means an indication of the security of the protection it will provide, for other things being equal this security will obviously vary with the extent of acreage over which the funds will be expended. The average rate of security afforded by State appropriations is less than one-half of one cent an acre, which unless supplemented by private or Federal funds is for the most part inadequate. The highest rate of security given by a State to both its own and private lands is one cent an acre, yielded by New York's appropriation of $75,000 for protecting about 7,200,000 acres in the Adirondack and Catskill mountain regions; however, the State makes no appropriation for protecting, nor is it authorized to protect its remaining millions of acres which may require protection, except along railroad lines. Minnesota gives less than four-tenths of a cent an acre toward protecting upwards of 20,000,000 acres and Oregon less than two-tenths of a cent an acre toward protecting over 15,000,000 acres. To protect the National Forests during a normal fire season costs about two cents an acre.

An exceedingly important problem with the States is the securing of emergency funds for fire-fighting. In some States the towns or counties pay the actual cost of fighting fires; in others the State shares the cost, while in still others it pays all, although there is a tendency, where State funds are inadequate, for timberland owners themselves to bear this cost, thus allowing the State to expend its funds chiefly for preventive measures. In general practice private owners are not reimbursed for expenses incurred in fighting fires on their own lands; some laws especially prohibit such reimbursement, not only to the owners or lessees themselves but their employees also.

JUST ONE MATCH, one smoke, one live coal, one spark, ONE CARELESS FOOL—and then less water and NO TREES.

REPRODUCTION FROM THE LAST PAGE OF THE FIRE CIRCULAR FOR CHILDREN.

Special provision has been made for the advancing of funds for fire protection purposes. Thus, in Maine the Governor may authorize the payment to the State forest department of any funds in the treasury not otherwise appropriated; a few other States allow their forest departments to draw on the treasury or the forest reserve fund for advances not to exceed a specified sum to meet expenses of fighting fires.

COOPERATION.

Undoubtedly the most effective way to meet the common fire danger which threatens timber properties at periodical intervals in nearly every portion of the United States is through the organized joint effort of all protective agencies — State, Federal, and private.

FEDERAL GOVERNMENT.

The Federal Government has, through Section 2 of the Weeks Law, recognized the importance of cooperating with States in the protection of forested watersheds of navigable streams, and has made an appropriation of $275,000 for the purpose. Forest fires by destroying the soil cover induce erosion in rough country, which causes the silting up of river channels, and, in consequence, loss of navigability. The fire problem on such watersheds becomes, therefore, one of broad, national importance and requires aid from the Federal Government. States which have received aid under this law include Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Maryland, West Virginia, Kentucky, Wisconsin, Minnesota, South Dakota, Montana, Idaho, Washington, and Oregon. The Federal Government desires to extend this cooperation generally. To secure it, a State must establish a fire protective system and appropriate funds for its use.

Another phase of Federal cooperation in fire protection which has recently been offered States is the reporting of forest fires by rural mail carriers. The Post Office Department has issued a special order to postmasters in the States which have established fire protective systems to instruct each rural carrier to report fires to the nearest forest officer on his route, or if no officer lives on the route to have him notified by some responsible citizen.

Wherever there are National Forests it is the established policy of the Forest Service to cooperate as far as its resources will permit with the State and with private owners whose interests are in common with its own. Cooperative agreements have been made with timberland owners, either individually or as associations, whose property is so situated in reference to National Forest lands that joint effort will mean more efficient and economic protection to both. Similar agreements have been made with railroad companies and States. Such cooperation is conducted on a give-and-take basis and where funds are expended the cost is pro-rated.

PRIVATE OWNERS.

Many private owners, including the railroads, have organized individual protective systems on their holdings. It

FOREST FIRES!

WARNING!

State Board of Forestry,
Baltimore, Md., June 1, 1913.

The Forest Laws of Maryland, as Amended April, 1910, impose:

A fine of $1,000 or imprisonment for one year, or both, for carelessly, or willfully, setting a fire to any woods or brush; also,

Payment of all damages caused by a fire allowed to escape to the injury of neighboring lands.

Section 5.—Anyone violating the forest laws is subject to arrest by a forest warden.

Section 6.—Any forest warden may summon male inhabitants of the county, between the ages of 18 and 50 years, to assist in extinguishing forest fires; refusal to serve is punishable by a fine of $10.

Section 9.—It shall be the duty of any person who discovers a forest or brush fire, not under control of some person, to extinguish it or to report it immediately to the local forest warden, and failure to do so shall be punishable by a fine of $10.

Section 10.—Every individual or corporation that carelessly, negligently, willfully, maliciously, or with intent sets fire, or causes, or procures to be set on fire, any woods, brush, grass, grain or stubble on lands not their own, shall be guilty of misdemeanor, and upon conviction shall be punishable by a fine of not less than $25 or more than $1,000, or imprisonment for not less than thirty days or more than one year, or both such fine and imprisonment.

Section 11.—It shall be unlawful for any person or corporation to land owner to set, or procure another to set fire to any woods, brush, logs, leaves, grass, or clearing upon their own land, unless they shall have previously taken all possible care and precaution against the spread of such fire to other lands not their own, by previously having cut and piled the same, or carefully cleared around the land which is to be burned, so as to prevent the spread of such fire. The setting of fire contrary to the provisions of this Section, or allowing it to escape to the injury of adjoining lands shall be prima facie proof of willfulness, or neglect, and the land owner from whose land the fire originated shall be liable in a civil action for damages for the injury resulting from such fire and also for the cost of fighting and extinguishing the same.

This notice is posted as required by law. There is a fine of $10 for removing or defacing it.

F. W. BESLEY,
State Forester.

"A BROTHERHOOD OF VENERABLE TREES."
—*Wordsworth.*

PREVENT FOREST FIRES!

This is the season when the woods are driest and small fires quickly grow to large ones. A large fire running through the magnificent forests of "Vacation Land" along the Lackawanna, would mean an incalculable loss. The beautiful Pocono Mountains, shorn of their timber, would not only lose their aesthetic charm, but hunting and fishing would be at an end and stream flow would quickly diminish.

Forest fires are unnecessary, nearly always the result of carelessness, and may wipe out in an hour what nature has taken a hundred years to create.

If you see a fire in the woods, no matter how small, put it out yourself or notify some forester or fire warden. Do not yourself be guilty of destroying the forest through carelessness with matches, cigars or cigarette stubs, pipe ashes or camp fires.

Everyone suffers from forest fires. Do your part to prevent the loss.

For information respecting Pennsylvania forests and tree planting write to the Commissioner of Forestry at Harrisburg, Pennsylvania.

RAILROADS AID IN FIRE WARNINGS.

Reproduction of a page from a D. L. & W. R. R. Time Table. Many other railroads have fire warnings, in various forms, in their time tables and all are of material aid in the campaign of education.

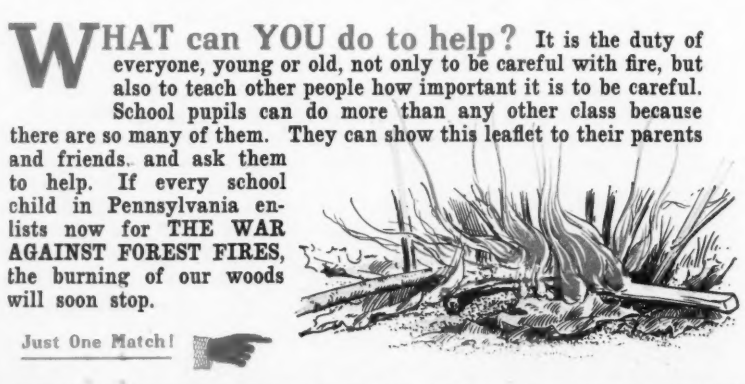
is significant that in States which have inaugurated fire protection, private owners have generally increased their activities, as a result of practical support and encouragement offered by the State in assisting them not only on their own lands but also by protecting adjacent lands of less careful owners. The negligence of a few often constitutes a menace that has effectively discouraged the establishment of protective work over large areas.

The most highly organized and the most generally effective form of private cooperation is the association of timber owners. The pioneer association of this kind was started in Idaho in 1906, and the movement has since spread through the northern tier of States to the Pacific and Atlantic coasts. In all, about 30 such associations have been organized in the States of California, Oregon, Washington, Idaho, Montana, Michigan, Pennsylvania, New Hampshire, and Maine. Each association has its by-laws and executive officers, and the members are assessed according to the acreage of their holdings to meet the cost of such protective measures as the directors may find necessary. As a rule, each member, whether his acreage is large or small, has equal vote in association affairs.

Some of the associations employ professional foresters to supervise their work, and practically all employ a chief fire warden or similar officer. Patrolmen or other members of the field force are usually given police powers and authority to summon help to fight fires through appointment as town or county fire wardens. Associations of this kind have been a powerful factor in bringing together in close cooperation all protective agencies, Federal, State, and private, in educating the public as to the value of fire protection, and in shaping remedial legislation.

FIRE PLAN.

The more advanced States have systematized their various protective measures in a plan for each fire district or protective unit in the State, based on the fire liability, the hazard, and upon the protective force and funds available. The *liability* depends upon the value of such destructible resources as timber, young growth, forage, and permanent improvements, in addition to the value of the forest and grass cover for watershed protection. The *hazard* is determined by an investigation of the causes, damages, and costs of fires in the State. The *protective force* provides for fire prevention and control by means of transportation, equipment, supplies, and the like; by co-operation with various protective agencies; and by providing for the organization and administration of the force of lookout watchmen, patrolmen, wardens, and available fire fighters. Wherever necessary the plan of protection is supplemented by maps showing the causes, location, extent, and dates of fires, headquarters of members of the force, location of improvements and supplies, areas covered


WHAT can YOU do to help? It is the duty of everyone, young or old, not only to be careful with fire, but also to teach other people how important it is to be careful. School pupils can do more than any other class because there are so many of them. They can show this leaflet to their parents and friends. and ask them to help. If every school child in Pennsylvania enlists now for THE WAR AGAINST FOREST FIRES, the burning of our woods will soon stop.
Just One Match!

STILL ANOTHER REPRODUCTION FROM THE FIRE CIRCULAR FOR SCHOOL CHILDREN.

by lookout stations and patrol routes, and other protective features necessary to a clear understanding of the plan.

ESSENTIALS OF STATE FOREST FIRE LEGISLATION.

The experience gained from what has been done, coupled with a knowledge of what still remains to be done, points the way to future State activities. State legislation in order to provide effective protection from forest fires must cover adequately the following essential features:

(1) The establishment of a non-partisan protective system under the direction of a State fire warden.

(2) Removal of the causes of fire and decrease of the fire hazard, and clear definitions of the extent to which violators of the law will be liable.

(3) Appropriation of funds.

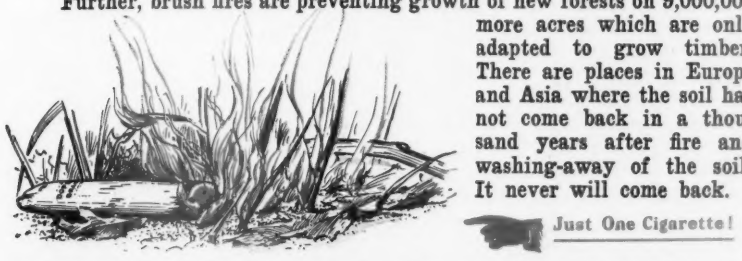
(4) Co-operation between all protective agencies.

The protective system in which politics is not a feature and whose members receive instructions from a competent man, as State fire warden, will unquestionably do the most effective work in the long run. It should be organized on the basis of preventing fires and of extinguishing while small those that start, to costs and losses at a minimum. The organization should include lookout watchmen, patrolmen, and experienced fire fighting crews to be mobilized quickly in emergency. It may also include an auxiliary force of watchmen, patrolmen, and fire-fighters, voluntary or paid, or both. The more elastic the organization and the more thoroughly all emergencies are planned and prepared for in advance the better.

Education of the public in fire prevention is of the first importance, and should include such measures as the widest possible dissemination of knowledge through the press, proper instruction in the schools, appeals by public speakers, wide and continued distribution of literature, and the enactment and enforcement of punitive laws for the destruction of forest property through carelessness in letting fires escape or wilfulness in setting them.

Laws should be broad and flexible, and should permit of such protection as may in the judgment of the State fire warden be the most practicable. Considerable latitude should be allowed the State forest organization, and in drafting them care should be used that they may be so worded that their intent will be clear, but that their interpretation need not be so strict as to make them unnecessarily drastic.

Measures for removing causes and reducing the fire hazard include: The use by railroads of oil for fuel, of electricity as a motive power, or of spark


BRUSH fires on timber land from which the trees have been cut destroy the land.
This land, if its woods-soil, also called "humus," or "mould," is not destroyed by fire, should be reforested or used for farming or grazing. Today there are about 4,000,000 acres of such land in Pennsylvania, CONSTANTLY GROWING POORER through brush fires instead of growing wood and furnishing homes for 160,000 people. Further, brush fires are preventing growth of new forests on 9,000,000 more acres which are only adapted to grow timber. There are places in Europe and Asia where the soil has not come back in a thousand years after fire and washing-away of the soil. It never will come back.
Just One Cigarette!

REPODUCTION OF ANOTHER PORTION FROM THE FIRE CIRCULAR FOR SCHOOL CHILDREN.

arresters; the clearing of rights-of-way through forest land, supplemented by the construction of fire lines adjoining the rights-of-way; the patrol of rights-of-way during dry periods, particularly after trains; and various other regulations for campers, hunters, loggers, and farmers, to minimize the danger.

The extent to which persons will be liable for violations of any of the provisions of law should be defined in clear and unmistakable terms. Penalties for all violations should be adequate, but not so severe as to interfere with prompt trial, and procedure for imposing penalties should be as simple and direct as possible.

FOREST FIRES MENACE PROSPERITY

A Little Care on YOUR PART May Result in the Saving of THOUSANDS of DOLLARS to CITIZENS of OREGON

Do You Realize that Oregon Timber Pays About One-third of the State's Taxes?

That Oregon's Forests Distribute More Wealth in the State than Grain, Fruit, Vegetables and Fish Combined?

GOOD CITIZENSHIP DEMANDS OBSERVANCE OF THE FOREST FIRE LAWS

OREGON FOREST FIRE ASSOCIATION
716-719 Yeon Building, Portland, Oregon

The protective system must have an adequate appropriation. States should be able to provide effective protection at an expenditure of not to exceed one cent an acre, if the larger private owners, the railroads, and other corporations will assist in the protection of their property. Ordinarily an appropriation of from $5,000 to $10,000 is sufficient to start the work and to demonstrate its value.

The co-operation of all protective agencies should be encouraged through the State with provisions in broad terms for expending funds jointly with them. The State acting alone can secure efficient protection only by an expenditure which, in most cases, would be excessive. Nor is it any more fair to relieve the private owner of his just share than it is to require him to stand the entire cost. There may be areas on which he would not be justified in expending protective funds, but which the State ought to protect for the public's benefit, just as the Federal Government, through the Weeks Law, has recognized its duty to aid in protecting the watersheds of navigable streams. State aid encourages private effort; Federal aid encourages both State and private effort. Experience has shown that the best results in fire protection have been derived from co-operation between the various protective agencies—Federal, State, and private, when they have shared the expense and have worked together.

In the open yellow pine forests of Washington and Oregon a collapsible plow is being used in digging fire lines to stop surface fires. The plow can be dismantled and folded into a compact form, so that it can be packed on horseback and weighs only 40 pounds. When in use, one man with a horse can do the work of 20 or more men working with shovels.

FOREST FIRES
BURNING BRUSH or SETTING FIRE in or near the woods IS UNLAWFUL throughout the year in this township WITHOUT A WRITTEN PERMIT from the local Firewarden. Penalty for violation, $50 to $200. A permit is not necessary if the fire is at least 200 feet from woodland or growth that may carry fire to the woods. Any legal FIRE MUST BE WATCHED UNTIL it is ENTIRELY OUT. Penalty for failure, $50 to $200.
To cause A FOREST FIRE IS A VIOLATION OF THE LAW. Penalty, $50 to $200.
A Firewarden's permit gives no release. Ignorance of the law is no excuse. Poor judgment or mishap relieves no one.
SMOKERS are warned that dropping lighted matches or tobacco in or near the woods may render them liable to this fine and do unguessed damage as well.
FIREWARDENS CAN ARREST ANYONE FOUND VIOLATING THE LAW
Small fires may grow larger and do your neighborhood much harm. Each fire stopped when small means increased property value to you and your neighbors. Put out at once any that you find, or, if you cannot do so, summon help.
All such fire-fighters are paid for their work if the local Firewarden is told of and approves the service within ten days after the fire.
Firewarden
Township
BY ORDER OF THE FOREST PARK RESERVATION COMMISSION OF NEW JERSEY, STATE HOUSE, TRENTON.

THE FIRE SEASON IN OREGON

By C. S. Chapman, *Manager Oregon Forest Fire Association*

REPORTS received by the Oregon Fire Association and the office of the State Forester show 1913 to have been the most satisfactory fire year of record. Information from all sources is not yet available, but when final figures are compiled they will differ little from those now on hand.

The loss this season in Oregon on private lands has been negligible. Not to exceed 250,000 board feet of green timber, worth $375, was destroyed by fire; logging equipment valued at some $7,000 was also lost.

Last season, though by far a less dangerous one from a fire-protection standpoint, saw a loss of over 40,000,000 board feet of green timber, valued at $60,000.

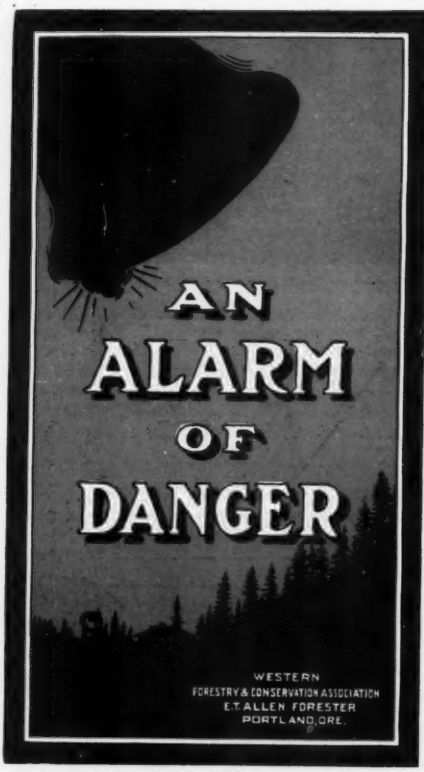
The total number of paid wardens protecting private holdings the past season was 330, a considerable increase over the number employed last year. Of this number 89 were State and Weeks Law patrolmen, the balance being paid by private owners either through forest-fire associations or individually.

For patrol and fire-fighting approxi-

mately $110,000 was expended this season. This is exclusive of the expenditures of the Federal Government on national forests.

Patrolmen were generally taken off the first week of September, due to heavy rains occurring, but these rains were followed by a dry spell lasting some three weeks, and a few wardens were consequently kept on until about October 1.

The most noticeable features of forest-fire work in Oregon the past season were: 1st, increased acreage put under co-operative patrol management. Eight new county patrol organizations were formed. 2nd. Promptness with which fires were handled. Many fires started, but in every case they were promptly checked, so that the situation was well in hand at all times. 3d. Better co-operation between protective agencies. 4th. Increase in intensity of patrol. 5th. Added care on part of operators to see that no fires occurred in their works.



THE VERY ATTRACTIVE COVER OF A PAMPHLET ISSUED BY THE WESTERN FORESTRY AND CONSERVATION ASSOCIATION TO SOUND A WARNING AGAINST NEGLECT OF THE FORESTS.

Outside the national forests, patrols in Oregon cover about 11,000,000 acres. Most of this area is covered by well-organized patrol associations.

The cost of patrol this season in the different sections was from 1c to 3½c per acre. This includes also the building of new trails and telephone lines, and the clearing out of many hundreds of miles of old trails. Throughout the State the work of completing telephone communication and installation of a complete system of trails was continued. The exact amount of such work completed will not be available until about November 1.

There is now no part of the State in which protection is lacking.

In the pine sections of Eastern Oregon from the nature of the country a patrolman can cover a large territory and range districts are often 50,000 to 75,000 acres in extent. In Western Oregon from 12,000 to 25,000 acres is the usual patrol district.

Lookout points have this season been more fully used than ever before, and it is the consensus of opinion among timber owners that to properly look after an area it must be covered by one or more lookouts as well as being thoroughly patrolled.

From the marked success of the Forest Service in the use of large mounted protractors fitted with allidades, as a means of accurately locating fires, such instruments will doubtless be generally used by private patrol associations another season.

In some parts of the State fall slash burning has not been possible, and spring burning will of necessity have to be resorted to.

The law of the last session of Ore-

gon's legislature, requiring owners to provide patrol for their property, has resulted in a much more equitable distribution of expenses for protection work than ever before.

The various patrol associations in the State have an aggregate membership of over 2,500 companies or individuals.

Cases of incendiary fire-setting have been rare the past season, and but few arrests have been necessary for violation of any nature.

GREATLY REDUCED LOSS FOR 1913

By E. T. Allen

Forester for the Western Forestry and Conservation Association

A SEASON of about average hazard, with fire loss practically nothing, is the 1913 report of the Pacific Coast patrol systems composing the Western Forestry and Conservation Association. The territory patrolled extends from northern Montana to northern California, embracing more than 20 million acres and fully 500 billion feet of timber. Reports to date on destruction of merchantable timber estimate it at 3 million feet, worth perhaps $5,000. Last year it was 76 million feet, nearly all, however, during a spring wind, before any patrol had begun; in 1911, 26 million feet; in 1910, 1½ billion feet. A few years ago, before the Northwest had systematic protection, the average was probably not less than the 1910 loss, although usually occasioned by more and smaller fires. The 1913 loss of logs and equipment around camps was also very low, probably not more than $10,000.

REPRODUCTION OF COVER OF A FIRE WARNING PAMPHLET ISSUED BY THE WESTERN FORESTRY AND CONSERVATION ASSOCIATION.

This year's success was by no means due wholly, or even chiefly, to weather conditons. Representative private and official protective agencies throughout the Pacific northwest were asked to submit a comparison of this season's hazard with that of other seasons. While there is some local variation in such comparison, the consensus is that, while 1913 hazard did not tax 1913 facilities overhard, this was because facilities were improved. The season itself was of average difficulty. Montana reports it "as great or greater than usual"; Idaho "average, excepting the unusually dry seasons of 1905 and 1910." Washington "not as bad as 1902 and 1910, or quite as bad as 1911, but worse than 1912 and averaging with other past years"; Oregon "about an average year, taking altogether."

In 1913 the northwestern patrol associations extinguished about 1,500 fires worthy of report. Not half of these were important enough to receive descriptive report. None were destructive fires in the usual sense. Yet there was ample wind and dry weather to have made a large proportion of the 1,500 destructive had other conditions been like those of a few years ago. In other words, protective effort now leaves no small fires smouldering to be fanned up by dangerous weather, and it can take care of those that occur in bad weather unless the latter is abnormally severe and protracted.

So while each fire year becomes less spectacular, and we become inclined to call it an "easy" year because it involves neither the strain nor the loss of other years, it would be folly for either forest owners or public to forget that this is due to increasing vigilance, expenditure and improvement of organization. Cessation of effort would return us to the old average of damage and, while we could now meet a year like 1910 with far less loss than then occurred, further perfection is still necessary to afford adequate insurance, and such a season may come when least expected.

To make this admirable 1913 record, the Pacific associations employed about 600 regular patrolmen besides extra men and spent, roughly, about $200,000. All favorable portions of the season were used for trail, telephone, and look-out building, and for disposing of dangerous slashings. In Washington alone State and association wardens issued 9,000 permits for slash burning, covering over 70,000 acres. Only two of these fires got away, and these were handled without damage.

Significant features of the season are a minimum loss from fires connected with logging operations, due to greatly increased interest by this class of operators, growing co-operation by railroad companies, and much greater care with fire by settlers, campers ,and the public generally, ascribable largely to educational campaigning. On the other hand, there was quite fire enough to place much of the credit on improved patrol. There was notable advance in co-ordinating the work of private, State, and Federal agencies so as to increase the efficiency of all. Continuation of the Weeks Law fund helped in this greatly. With few exceptions the State systems improved much in strength and co-operative spirit. Probably the greatest innovation in American fire work this year was the Oregon compulsory patrol law, under which about 3,000 new owners are contributing to work formerly borne by their more progressive neighbors.

The Western Forestry and Conservation Association has extended its educational work in many directions, and has also been obliged to enlarge its scope as a co-operative medium between western private and official agencies to take a representative position in national forest activities both in the United States and Canada.

But the best single result of the 1913 fire season is to prove that systematized co-operative effort, at an insignificant cost per acre or per thousand, can reduce our forest losses of an average year from four or five million dollars to about as many thousand.

SAVE IDAHO

MILLIONS OF DOLLARS YEARLY

BY BEING CAREFUL IN THE USE OF FIRE

FOREST FIRES MEAN—

DANGER TO LIVES AND HOMES OF SETTLERS
LABOR TURNED AWAY EMPTY-HANDED
REDUCED MARKET FOR OUR CROPS
HEAVIER TAXES ON OTHER PROPERTY
STREAM FLOW DISTURBED

For every dollar lost by timber owners, the **Community Loses** Five times as much in

WAGES AND MARKET FOR SUPPLIES

GOOD CITIZENSHIP FORBIDS—THE LAW PUNISHES—

Tossing away burning matches or tobacco;
Building camp fires in leaves, rotten wood or against logs, where they may spread or be impossible to extinguish;
Leaving any camp fire before it is out;
Burning brush or slashings in dry season without permit;
Using spark-emitting engines in the dry season;
Refusing to fight fire when summoned by a fire warden.

CARE WITH SMALL FIRES, BY PREVENTING LARGE ONES, MEANS PROSPERITY INSURANCE

Violation of these rules may cause injury and distress beyond calculation. Help Enforce Them! Put out any fire you find if you can. If you cannot, notify a fire warden, some other public officer or the land owner.

For the law send to—

STATE LAND COMMISSIONER
BOISE, IDAHO

SLIGHT LOSS IN WASHINGTON

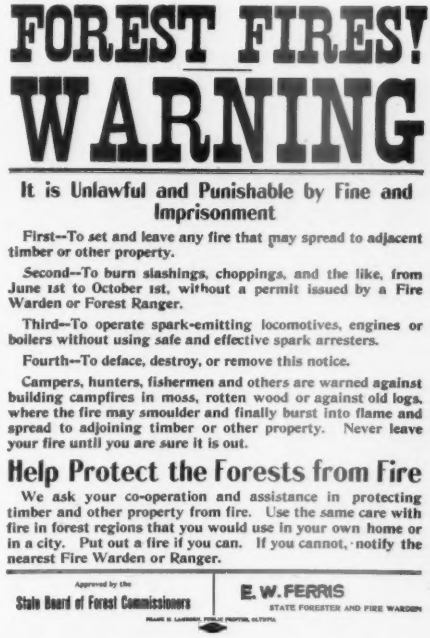
By F. J. Davis, *Secretary Couer D'Alene Lumber Protective Association*

THE fire season of 1913 in Washington is now closed, the last patrolman being released September third.

The season has been a very successful one, there having been practically no loss of standing, green timber, and but slight losses by fires occurring in the slashings of logging operations, although many fires were caused by lightning on account of the numerous electrical storms we have had.

This association received approximately $900 from that portion of the Weeks Law appropriation allotted to Idaho, which enabled us to keep our assessments on membership acreage down to 1¼c per acre.

Our fire-fighting expense has been below normal, most of our fires having been extinguished by patrolmen. The principal expense of the season's operations has been patrolmen's salaries and subsistence, extension of telephone lines and trails, with the necessary expense of repairing telephone lines previously built, and clearing out trails at the beginning of the season, both of which were more expensive than usual on account of the extreme snowfall and many wind storms of last winter.


FOREST FIRES!
WARNING
It is Unlawful and Punishable by Fine and Imprisonment
First--To set and leave any fire that may spread to adjacent timber or other property.
Second--To burn slashings, choppings, and the like, from June 1st to October 1st, without a permit issued by a Fire Warden or Forest Ranger.
Third--To operate spark-emitting locomotives, engines or boilers without using safe and effective spark arresters.
Fourth--To deface, destroy, or remove this notice.
Campers, hunters, fishermen and others are warned against building campfires in moss, rotten wood or against old logs, where the fire may smoulder and finally burst into flame and spread to adjoining timber or other property. Never leave your fire until you are sure it is out.
Help Protect the Forests from Fire
We ask your co-operation and assistance in protecting timber and other property from fire. Use the same care with fire in forest regions that you would use in your own home or in a city. Put out a fire if you can. If you cannot, notify the nearest Fire Warden or Ranger.
Approved by the
State Board of Forest Commissioners
E. W. FERRIS
STATE FORESTER AND FIRE WARDEN

PENNSYLVANIA'S ACTIVE WORK

By Geo. H. Wirt

Forest Inspector, Pennsylvania Department of Forestry

THE extinction of forest fires has cost the State of Pennsylvania this year about three times as much as during the same period in 1912, and about two-thirds as much as in 1910. The spring of 1912 was unfavorable for fires, owing to frequent rains. This season was dryer and larger fires resulted. Whether the passage of a hunters' license law increased the number of fires it might be hard to prove, but one thing is certain: Forest fires begin with fishing season in spring and continue until the end of hunting season in fall.

There is no doubt but that increased activity on the part of fire wardens and their employes would greatly lessen both the number and the extent of fires. This last month the Bedford county court fined a man for not fighting forest fire upon the request of one of the fire wardens. The fine and costs amounted to about $60.00.

Upon the State forests there has been a marked reduction in the area

STOP
Forest Fires

They are a Curse to the People of Pennsylvania

FOREST FIRES DESTROY

Existing Forests
Possibility of Future Forests
Possibility of Labor
Beauty of a Region
Comfort
Homes
Lives
Prosperity

Protected Forests Increase in Value

They Furnish Labor, Promote Industry, Afford Recreation and Sport, Make a Region Beautiful, Make Homes Safe and Comfortable, Make Life Worth Living, and a Prosperous State Inhabited by a Contented and Industrious People.

Which Would You Rather Have

FOREST FIRES		GREEN FORESTS
FLOODS		PURE WATER
DISEASE	OR	HEALTH
DESTRUCTION		THRIVING INDUSTRIES
DEVASTATION		PROSPERITY

For Information Respecting Pennsylvania Forests and Tree Planting, write to

COMMISSIONER OF FORESTRY,
Harrisburg, Pennsylvania

THIS LARGE POSTER, 14 x 22 INCHES, HAS BEEN OF EXCELLENT SERVICE IN PENNSYLVANIA.

THIS ILLUSTRATION, ON THE LETTER HEADS OF THE MICHIGAN HARDWOOD MANUFACTURERS' ASSOCIATION'S FOREST FIRE PROTECTIVE DEPARTMENT, SPEAKS MORE ELOQUENTLY THAN A FULL PAGE OF TEXT.

burned because of the continued opening and improvement of roads and trails, the building of telephone lines, and the establishment of lookout stations.

In the spring of 1912 several institutions interested in forestry combined in the publication of a forest fire circular to be distributed to the school children of the State. The idea of such a circular originated with the Western Forestry and Conservation Association. A million copies were printed and distributed. In February of 1912 the Pennsylvania Railroad Company issued posters relating to forest fires and posted them in their stations. Several other railroads took special means to call attention to the extinction of forest fires.

This summer the State Department of Forestry issued a poster, 14x22 inches, which relates to forest fires. A large number of the railroad companies within the State are posting these notices in their stations. Foresters, fire wardens, and private individuals have been asked to post them where they will be read. The newspapers of the State have called the attention of their readers to the posters and in many instances added their own warning against forest fires.

Recently a small circular containing facts about forest fires has been issued by the department and distributed widely.

There are two fire protective associations within the State. The last legislature passed an act permitting the Department of Forestry to cooperate with such organizations. The State will expend for patrol service an amount equal to what the association raises for all protective measures.

The boy scouts are becoming an active force against forest fires, and have done splendid work in various parts of the State.

Three native species of larch furnish timber in the United States. One grows in New England and the Lake States, another in the Pacific Northwest, and the third in the high mountains of the northern Rockies. European larch has been planted extensively in the prairie States.

FOREST FIRES

YOUR HELP IS ABSOLUTELY NECESSARY TO PREVENT WOODLAND FIRES. READ THESE LAWS, OBEY THEM AND HELP ENFORCE THEM IN YOUR TOWN. GET PERMIT FROM WARDEN BEFORE KINDLING FIRES IN SPRING OR FALL. DO NOT THROW DOWN LIGHTED MATCHES, CIGARS OR OTHER MATERIALS. NOTIFY THE NEAREST WARDEN IN CASE OF FIRE AND GET BUSY YOURSELF.

EXTRACTS—CONNECTICUT FOREST FIRE LAWS.

1. **Kindling a fire upon public or private land without permission** of the owner is subject to fine and imprisonment. See 1220 Gen. Stats.

2. **Kindling a fire in woodland without clearing space of 20 feet around it** is punishable by fine and imprisonment. Fires must be extinguished before leaving. Chap. 43 Pub. Acts 1907.

3. **Kindling a fire in the open air** which damages property of another is subject to fine and imprisonment. Chap. 128, Sec. 3, Public Acts 1909. **Persons setting fires which runs on land of another** are liable to the owner for all damages caused. Sec. 1096 Gen. Stats.

4. **Kindling a fire by throwing down a lighted match, cigar or other burning substance** is punishable by $500. fine or imprisonment six months or both. Sec. 1220 Gen. Stats.

5. **Permits required for kindling fires March 15th to June 1: Sept. 15 to Nov. 15.** Written permission from a local warden is required for kindling a fire in the open air except in a ploughed field, garden or public highway not less than 200 feet from woodland, brushland or land covered by dry grass or other inflammable material. (This law does not apply to kindling fires in cities, boroughs, organized fire districts, and on land controlled by railroad company.) Violation of this law is punishable by $200. fine or six months imprisonment or both. Chap. 124, Sec. 2, Public Acts 1911.

6. **Any fire warden may arrest without warrant** persons taken in the act of violating any laws for the protection of forest and timberlands. Chap. 238, Sec. 4, Public Acts 1905.

7. The law provides a penalty of $10. for injuring this notice. Chap. 238, Sec. 10, Public Acts 1905.

Posted by order of
WALTER O. FILLEY,
State Forest Fire Warden.

FOREST FIRES IN CONNECTICUT

By W. O. Filley, *State Forester*

THE forest-fire season of 1913 in Connecticut has been extraordinary in that the summer fires have been much more numerous than usual. In our hardwood timber most of the fires occur either before vegetation becomes green in the spring or after the leaves have fallen in the autumn. This gives us two distinct fire seasons, varying with weather conditions, but usually separated by a summer season with very few fires. Fires spread rapidly when the leaf litter is thick and dry, with no green vegetation to check them, and often extend over considerable areas if not soon discovered. Such fires burn quickly and are mostly confined to the surface, destroying young growth, but not often doing serious damage to older trees except where there is an accumulation of leaf litter around their bases.

With regard to such fires, the season of 1913 has been normal, worse than 1912, but not so bad as 1911 and 1910. Beginning with May, however, a period of drought began which has extended through the summer, and produced con-

ditions favorable to ground fires. There were 140 fires reported during July and August as against 58 for the same period in 1912, 45 in 1911, and 9 in 1910. Most of the fires this summer were small in extent, but because the ground was very dry, burned deep, often smouldering until all vegetable matter in the soil was consumed.

As a result the expense of fighting the fires was much greater than usual. It seemed to be impossible to completely extinguish some fires, and because of the danger of their breaking out anew it was necessary to watch them until sufficient rain had fallen to remove the danger. In one instance a fire, which was started by a fire balloon on the night of July 4, was very quickly cornered in a swamp, where it continued to smoulder in spite of all efforts to put it out until heavy rains toward the middle of September accomplished the desired result. The burned portion of the swamp did not exceed two acres, but all the trees on the area were felled by the fire consuming their roots.

Another fire, on the top of a small mountain much used as a picnic ground, was supposedly completely extinguished six times in as many days, gradually extending itself from one acre to ten during that time. The seventh day it broke out again and spread more rapidly, requiring the efforts of fifty men for three days to get it under control again. Water was hauled up the mountain in four-horse loads of milk cans and stored in a tank wagon, from which it was carried where needed in Adams shoulder-pack water bags, which proved of great value. Bucket spray pumps were used in applying the water to the fire. It proved necessary to scratch a trench two miles long around the entire mountain top before the fight was over. Even then it was necessary to patrol this line for two days and nights until a heavy shower settled all danger of a new outbreak. If the soil had not been shallow and rocky, this rain would have proven insufficient, as it did in other localities.

Lookouts were not maintained through the summer, as previous years had not shown the need. It seems improbable that they would have reduced the fire damage had they been continued, since the summer fires spread slowly, and the problem was not to secure prompt attention, but to effectually extinguish them.

NORMAL SEASON IN MICHIGAN

By Marcus Schaaf, *State Forester*

On the whole, forest-fire conditions on the Michigan State Forests have been quite normal so far this season. Exceptionally dry but short periods accompanied by high winds occurred in the months of April and June, at which times the worst fires were experienced. This condition was brought about largely by the fact that the development of the vegetation covering the ground was greatly retarded by cold nights and heavy frosts.

The losses for the year amount to 1,366 acres burned over, or approximately 1 per cent of the area patrolled. No financial loss of any consequence resulted from these fires, as no merchantable timber, and but very little second growth, was killed, the burnings for the most part having been confined to open pine plains. The greatest damage was the construction of the humus.

Should the fall rains prove to be normal through the month of October little apprehension need be felt for the remainder of the season; otherwise, with the annual accumulation of falling leaves and frost-killed vegetation, conditions will still be very favorable for serious conflagrations.

$250,000 DAMAGE IN CALIFORNIA

By G. M. Homans, *State Forester*

THE season has been exceptionally dry and many fires have occurred throughout the State. Excluding two very large and damaging fires, the latest report sets the acreage burned at 313,214, with a total damage amounting to $250,000 in round numbers.

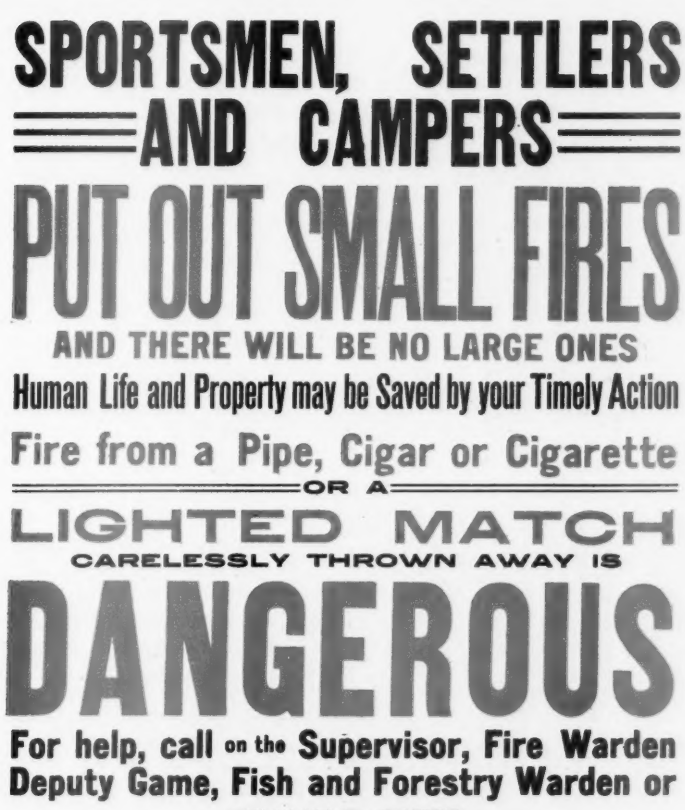
Fires have occurred frequently within the national forests, and a full report including these has not yet been prepared. Of the 313,214 acres, 25,000 acres were timber; 112,139 acres were grass, and 176,075 acres were brush. Conditions will continue to be hazardous until there is sufficient rain to start a new growth of grass and other ground vegetation. It is estimated that about 50,000,000 feet of timber have been burned during the summer.

Although the estimated damage has been large it appears but small when compared with the loss of three human lives. During a recent fire the flames, fanned by a terrific north wind, surrounded a dwelling before the occupants, a mother and her little child, could make their escape. Evidently the terrified mother sought refuge in the cellar as soon as she knew the house was burning, for there the bodies were found. The third victim was a retired army officer who perished in a brave but futile attempt to save his home. Such cases impress upon us forcibly the actual need and advisability of a systematic plan of forest protection.

In Southern California a large fire destroyed a great portion of the bee industry. Five hundred stands of bees were burned; the sage plants, from whose blossoms the honey is obtained, will require three years in which to attain a size of economic value. The loss occasioned by this fire is estimated to be $25,000.

During the last session of the legislature the State Forester had a bill introduced the purpose of which was to provide for effective forest protection throughout the State. In substance the measure provided for an appropriation from the State to meet expenses incurred by State fire wardens while fighting fires; an organization to supervise such expenditures, and a more efficient plan of fire patrol. The bill received the support of the administration and passed, with practically no opposition, in the Senate. Included in the budget an amount of $50,000 was granted for the purpose of fire protection. However, owing to a technical misunderstanding the bill failed to pass the Assembly; consequently, the fund allotted in the budget was rendered inaccessible. Another forestry bill is now in course of preparation, embracing the same general features. The plan of the State Forester is to divide the State into districts, appointing over each a district warden who shall receive a regular salary, shall become thoroughly familiar with his territory, and recommend the appointment of local firewardens. These men will receive compensation for time actually spent fighting fires, and will have the same

A STICKER WHICH CARRIES A MESSAGE.


SPORTSMEN, SETTLERS
AND CAMPERS
PUT OUT SMALL FIRES
AND THERE WILL BE NO LARGE ONES
Human Life and Property may be Saved by your Timely Action
Fire from a Pipe, Cigar or Cigarette
OR A
LIGHTED MATCH
CARELESSLY THROWN AWAY IS
DANGEROUS
For help, call on the Supervisor, Fire Warden
Deputy Game, Fish and Forestry Warden or
WILLIAM R. OATES
State Game, Fish and Forestry Warden
LANSING, MICH.

THIS IS A POSTER WHICH HAS BEEN WIDELY DISTRIBUTED THROUGHOUT MICHIGAN.

authority as is given the firewardens under the present system, but with the added power to guarantee payment from the State to men called upon by them for assistance.

So, the voluntary State firewarden system still obtains in California. Public-spirited citizens, appointed by the State Forester and equipped only with the power of peace officers to make arrests for violations of the forest laws, direct voluntary crews in suppressing fires originating in their respective localities.

Much effective protection is being secured by several counties and by private and county co-operation under the direction of fire protective associations. There are three such associations now active, and it is hoped that others may be organized. Splendid results have been obtained; a thoroughly efficient system of patrols and a general public sentiment acting favorably have greatly simplified the fire problem in these localities.

The State Forester, although greatly handicapped by insufficient appropriation, has endeavored to have a representative from his office on all large fires outside the national forests to assist in directing and to formulate definite plans of action. Much good has been done in this way, and there is a general spirit of public appreciation on the part of all who are familiar with the problem before him.

REDWOOD ASSOCIATION WORK

By R. D. Swales, *Secretary*

I AM exceedingly glad to be able to report for the Redwood Fire and Protective Association of California no forest fires in the green timber this year. We have had several small fires on cut-over land, which I have segregated as follows:

1. Number of fires extinguished, 6. Causes: Hunters, 1; clearing land, 2; clearing railroad right of way, 1; tie slashings, 1; unknown, 1.

All of the above fires on cut-over land.

2. Approximately 150 acres of cut-over land burned over. Damage none, as the land had heavy stands of blue blossom on and lots of debris.

3. We have had a very favorable season, although at this date, September 15, the fire hazard is greater than it has been at any other time, as we have had no early rains which generally come at this time of the year.

We have two patrolmen who are looking after approximately 100,000 acres of timber, and we also have other arrangements with the railroad and settlers to report any fires they may see.

We have completed the fire trails over all the timber that is under the supervision of this association, and we are in a splendid position to fight any fires that may occur in our district.

The plans of this association to extend its territory were not completed this year, mainly on account of the uncertainty of what kind of forest laws were to be enacted at the last session of the legislature, but we hope to take this up again next year.

Our assessment this year was 1½c per acre which gave us about $1,200 for fire-protection purposes.

WEST VIRGINIA AWAKENED

THAT a better system for protecting the forests from destruction by fires is to be established in West Virginia has been definitely decided as a result of a conference between Governor Hatfield and J. A. Viquesney, State forest, game, and fish warden.

The last session of the legislature appropriated $25,000 for the protection of forests and the protection and propagation of game and fish. The appropriation is to cover the period until June 30, 1915.

Governor Hatfield has decided to use about $10,000 of this fund during the next two years in establishing a system, and in protecting the forests from fires. He believes that not only the future supply of game and fish, but the water supply of the whole State depends on the conservation of our forests.

Five lookout stations are to be erected at once and properly equipped with field glasses and fire-fighting equipment. Telephone connections will be made with these stations from all the surrounding country and watchmen stationed there during all the danger season to give an alarm in case of discovery of fire. This system will be extended throughout all of the forest area of the State as rapidly as proper co-operation with timber owners and organizations can be effected and Federal co-operation secured.

Manufacturers of artificial limbs are seeking substitutes for English willow, used because of its combined lightness and strength. It is claimed that the Port Oxford cedar of the Pacific Coast will prove equally serviceable.

FOREST FIRE SITUATION IN NORTH CAROLINA

By J. S. Holmes, *State Forester*

In North Carolina we have two main fire seasons, lasting on an average from six to ten weeks. While fires occur throughout the intermediate seasons they are neither so frequent, so large or so destructive as are those occurring during the spring and fall seasons.

The fall fire season of 1912 was one of the most destructive of recent years in the mountainous parts of the State, piling up a total reported damage for the year in the 17 counties west of the Blue Ridge alone, of over $600,000.

Following this the spring season of 1913 began about March 1 and continued intermittently until the middle of May. Though well defined precipitation periods occurred at intervals throughout this season, some districts had little rain for two or three weeks at a time. Early in March fires were reported from both eastern and western North Carolina, one in the latter region, supposed to have been set by fox hunters, destroying a large amount of timber, and miles of rail fences.

From the middle of April to the middle of May and in some cases up until almost the end of that month, fires raged both in eastern North Carolina and in the western Piedmont region. In the Linville Mountains and along the eastern slope of the Blue Ridge fires burned for three or four weeks, causing untold damage to timber and young growth over a belt 50 to 60 miles in length. One of our leading newspapers commented thus: "Millions lost in big forest fires. Carolina mountain timberlands suffer almost irreparable damage. Curtails revenue." Destructive fires occurred throughout the Coastal Plain region during May, perhaps the Dismal Swamp region and Greene and Lenoir counties being the worst sufferers. Though strenuously combatted here and there by bands of fire fighters, where houses or other valuable property was endangered, it remained for steady rains to extinguish the fires in most cases. The fall fire season, which starts with the falling of the leaves, has not yet begun (October 6).

Influenced by the fire losses of last year, some members of the legislature made a determined effort to secure improved forest fire legislation at the regular session of the General Assembly last winter. The bill they supported, however, which had been drawn up by the North Carolina Forestry Association and modified by a legislative committee, never got beyond the committee stage. The only measures passed at that time which in any way affect the fire situation were one to include hunters with wagoners in the section relating to camp fires, and a bill to protect the watersheds of cities and towns from fires. The aid of neither of these laws has apparently yet been invoked. What we chiefly need now is some measure to facilitate law enforcement.

At the present time the legislature is in special session to consider proposed amendments to the State Constitution. The two proposed amendments which promise to have the greatest influence towards securing forest protection are one which allows the classification of property for taxation, segregation of sources of revenue, and progressive or graded taxation, and one which forbids the passage of certain classes of local laws by the General Assembly, thus allowing them time for the consideration of more important general laws—a State forestry law, it is to be hoped, among the first. Both these amendments will probably be adopted at the next general election.

$60,000 LOSS IN NEW YORK STATE

By C. R. Pettis, *Superintendent of State Forests*

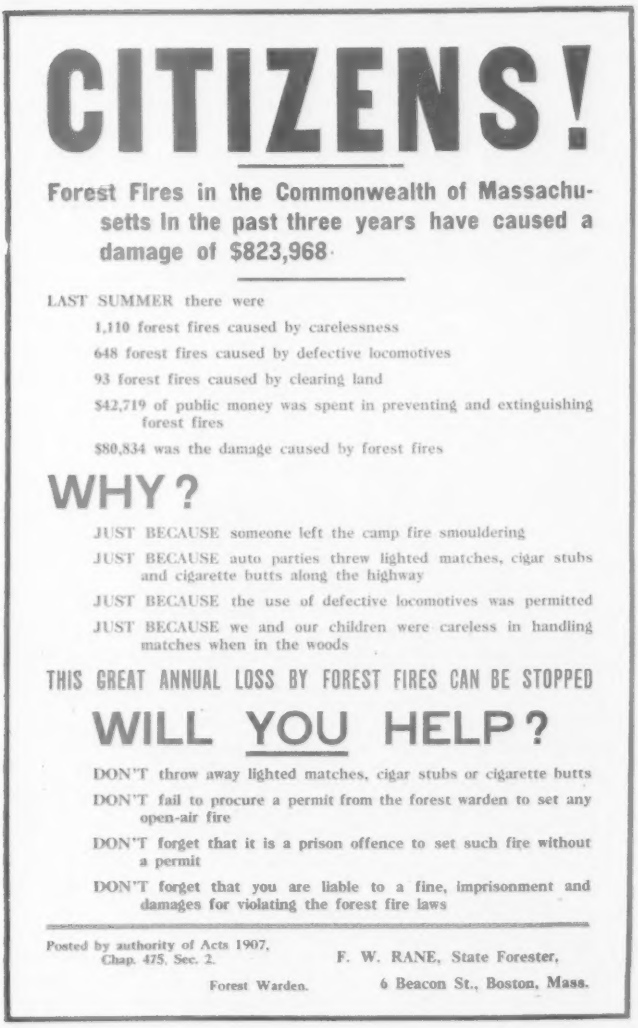
FOREST fires in New York State have been particularly severe in the cycle of years 1894, 1899, 1903, 1908 and 1913, and they will go down in history as those in which a large number of fires have occurred. On account of the similarity in drought and forest conditions, the fairest comparison of the present protective system with the former fire warden system can be made by contrasting the years 1908 with 1913. In the former year 605 fires burned over 368,072 acres doing $802,000 worth of damage and the cost of extinguishing was $189,661.51.

While the reports of fires for the present year have not all been received, it is known that over 500 fires have occurred that burned over about 60,000 acres and the damage approximates $60,000. The extreme conditions of drought which are the primary reasons for fires were more severe in 1913 than 1908, and while practically as many fires have occurred the acreage burned is but one-sixth as much as of the former year, and the damage about one-thirteenth. These results are due to the well-organized force maintained by the Conservation Commission. This force is under the general charge of Superintendent of Forests and the immediate supervision of the Assistant Superintendent of Forests.

The Adirondacks are divided into four fire districts, the Catskill territory into one. Each of such districts are in charge of a district forest ranger. These forest ranger districts are subdivided into definite territories, each in charge of a ranger. The rangers duties consist in patrolling the dangerous places, watching out for fire, meeting people, instructing them in regard to building camp fires, giving them literature and keeping in close touch with the entire territory. Also whenever a fire occurs he immediately summons help and endeavors to extinguish the same promptly. During the past four years fifty mountain observation stations have been established. Each of these observers as well as the rangers have connection with the Commercial Telephone System, and the observers are provided with a camp, field glass and map of their territory, together with a list of the rangers, fire wardens, land owners, etc., to be notified in case of fire.

COULD THERE BE DEVISED ANYTHING WHICH FOR THE SPACE IT OCCUPIES TEACHES SUCH A LESSON AS THIS?

Ninety-five per cent of the fires are detected by these observers while fires are in their incipient stages, and but very few fires occur which are not extinguished promptly. There have been two exceptions during the past summer. One fire caused by lightning started about six miles from any habitation in an old fire slash, and although observed by a mountain station man immediately and a warden dispatched with help at once, it secured, on account of the high wind, such headway that it was impossible to extinguish the same with the help available. This fire burned



CITIZENS!

Forest Fires in the Commonwealth of Massachusetts in the past three years have caused a damage of $823,968.

LAST SUMMER there were

1,110 forest fires caused by carelessness

648 forest fires caused by defective locomotives

93 forest fires caused by clearing land

$42,719 of public money was spent in preventing and extinguishing forest fires

$80,834 was the damage caused by forest fires

WHY?

JUST BECAUSE someone left the camp fire smouldering

JUST BECAUSE auto parties threw lighted matches, cigar stubs and cigarette butts along the highway

JUST BECAUSE the use of defective locomotives was permitted

JUST BECAUSE we and our children were careless in handling matches when in the woods

THIS GREAT ANNUAL LOSS BY FOREST FIRES CAN BE STOPPED

WILL YOU HELP?

DON'T throw away lighted matches, cigar stubs or cigarette butts

DON'T fail to procure a permit from the forest warden to set any open-air fire

DON'T forget that it is a prison offence to set such fire without a permit

DON'T forget that you are liable to a fine, imprisonment and damages for violating the forest fire laws

Posted by authority of Acts 1907, Chap. 475, Sec. 2.

F. W. RANE, State Forester,
6 Beacon St., Boston, Mass.

Forest Warden.

nearly a month and spread over an irregular area, some places twelve miles long and in some instances three to four miles wide. On the whole, it covered about 30,000 acres. The area burned with the exception of about one hundred acres was entirely old fire slash. All of the available help in that locality was secured and retained on the fire during the entire time, and in addition six companies of the Fifth Infantry, U. S. A., were ordered to the scene and rendered excellent services.

The other large fire occurred in the western part of the Adirondacks about four miles long and about one mile wide, and burned over approximately 1,800 acres of land which had been burned over at least twice before.

The appropriation for fire protective work is $100,000 per year. During

the summer months the pay roll was approximately $7,000 a month. During the past year $5,000 were allotted by the U. S. Forest Service under the Weeks' law for additional protection. The entire expense of actual fighting fire accounts audited to September 16 was $17,000.

While a large area has been burned over by the fires this year comparisons must be made with 1908 or similar years of drought and at the same time it must be borne in mind that while approximately $190,000 were expended for fighting fire in 1908, probably not more than $35,000 will be expended this year for the same number of fires and the area has been kept to nearly one-sixth of that of the former occurrence, and also in 1908 nearly 200,000 acres of timber land were burned, while the present year probably not more than five hundred acres have been injured. We hand you a tabulation of the forest fires reported to this office complete to September 15, 1913, by counties.

The commission also maintains a force of six inspectors for examining the front end and ash pans of all locomotives which operate in this State, as well as having the railroads rid their rights of way of inflammable material according to law. During the past two years a definite plan has been effected with the railroads. They have submitted blue prints showing plan of design for fire appliances and are actively at work putting their engines into satisfactory condition. During this period nearly eight thousand locomotives operating in this State have been inspected. The work which we are doing in this connection is not only a benefit to New York State but to nearly all the surrounding States. In addition the lines operating in the Adirondacks during the summer season use oil as fuel.

FOREST FIRE PREVENTION IN VERMONT

By Robert M. Ross

VERMONT, with over half of its land better fitted for growing trees than for the raising of any other crop, has lately taken a great interest in the various branches of forestry. The State, a few years ago, had practically no system of fire prevention, but today stands well up in the list of States which are striving to reduce to a minimum the danger of forest fires.

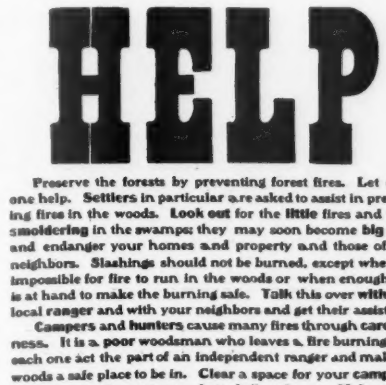
Vermont has taken warning from the damage done by destructive fires within her own borders and adjoining States, and established a protective system in cooperation with the Federal Government, which will practically eliminate the possibility of extensive damage in such a way. This year $1,500 was set apart from the annual forestry appropriation for fire protection, and through the operation of the Weeks bill, the State receives from the Federal Government a like sum, making a total of $3,000 this year for such work in the State. As this sum has to be spent in the protection of the headwaters of navigable streams in the United States, the State has been divided into two ranges. Range 1 includes the northwestern part of the State, or, in other words, that part of the territory for which the funds authorized by the Weeks bill cannot be used, while Range 2 includes the remainder of the State, that is, the northeastern and southern sections in which this money must be expended. Both of these ranges are in charge of rangers who keep in touch with the town fire wardens, and attend to other matters which pertain to forest fire work.

The two main branches of this protective work are a series of lookout stations and a system of patrolling. Within the last few years so much has been said and written in favor of lookout stations on mountains from which an extensive view of the surrounding country can be obtained, that many are now convinced of the necessity of their establishment. While these are of very

great value in some wooded sections, in other portions of the district a system of patrols is of inestimably more value.

At the present time Vermont has four lookout stations in operation, with prospects of the erection of another one in the immediate future. Two of these present stations have been erected by the owners of woodland in the vicinity of the stations, that is, these owners have paid one-half per cent per acre on the number of acres protected, and have placed this sum at the disposal of the State Forest Service, which has constructed the cabin, tower, and telephone line. The other two stations, which are located on State forests, were constructed by the State itself. Men are kept at these stations during the dry periods of the year, that is, from May to October, and whenever they discover smoke which they believe is from a forest fire, a telephone message is sent to the town warden in the town where the smoke is seen.

We have already stated that in several sections of the State patrols are of far more value than lookout stations. During this season we have had several patrolmen out, a few of whom we have kept along sections of railroad tracks where there is espicial danger of fire starting. The others have confined their work to districts which are frequented by fishermen, hunters, and campers. These patrolmen secure the names and addresses of all individuals in such parties they meet in the woods, warn them of the danger of fires, and caution them about building fires. In doing this they are not only lessening the danger but are creating a most valuable interest in forestry in most of those with whom they come in contact. This matter of educating people along forestry lines in certain sections of the State is one of no little importance.


HELP
Preserve the forests by preventing forest fires. Let every one help. Settlers in particular are asked to assist in preventing fires in the woods. Look out for the little fires and those smoldering in the swamps; they may soon become big ones, and endanger your homes and property and those of your neighbors. Slashings should not be burned, except when it is impossible for fire to run in the woods or when enough help is at hand to make the burning safe. Talk this over with your local ranger and with your neighbors and get their assistance.
Campers and hunters cause many fires through carelessness. It is a poor woodsman who leaves a fire burning. Let each one act the part of an independent ranger and make the woods a safe place to be in. Clear a space for your camp fire. Build it away from stumps, logs, duff and peat. Make only a small fire. Be sure it is out when you leave. Put out any uncared for fire you find, if you can. If you can't, notify a ranger, any public officer, or the owner of the land.
Even young timber has a value and it will soon be worth more. Each one of us loses money if the trees burn up before they are cut and put to use.
It pays to be careful. If you allow a fire to escape, you are liable for the damage it does, and to a fine and imprisonment. The state law in regard to forest fires is strict and it is the duty of every citizen to help the rangers enforce it. By doing so, you will be adding wealth to the state and making Minnesota a safe place to live in.
$25.00 Fine for Defacing or Destroying This Notice.
ST. PAUL, MINNESOTA. APRIL 1, 1911.
WM. T. COX,
STATE FORESTER.

During the last legislature several new laws were enacted which pertain to forestry in the State. One of these laws changed the manner in which town fire wardens are appointed. Formerly the first selection in each town was the warden, and, as in many cases the selectmen were not adapted to fill the position, thus the system became very weak in this respect. Now the law stipulates that if the selectmen of a town, with the approval of the State forester, do not appoint a fire warden by March 1, the State forester has the power to appoint the official. This provision makes it possible to secure good wardens in the various towns, and to keep them in office as long as is desirable. These wardens are paid at the rate of $2.00 per day when actually engaged in fire work, all other men who are hired to do fire fighting work are paid by the town at the same rate as those engaged in work on the roads, which is usually $1.75 per day. Whenever the amount expended in fighting fire in a town exceeds five per cent of the grand list of the town, the State pays the sum over this per cent. Thus the poorer towns are helped by the richer ones, an arrangement which seems no more than right. Another law which helps to increase

the efficiency of the protective system, is that which allows a warden from one town to go outside of his own town and fight fire. Thus a warden in one town is practically a warden in any and all towns of the State.

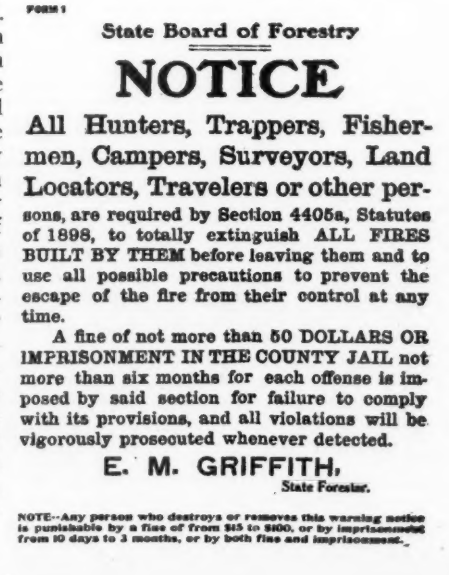
In regard to establishing patrols in very dangerous sections, there is a law which empowers any warden of a town, with the approval of the State Forester, to appoint a patrolman during dangerous periods, said patrolman to be paid by the town in which his work is done.

For the past two years the State Forest Service has kept its patrolmen busy during the months when the danger of fire is small, by having them work on trails in the mountainous sections of the State. Previous to this year, the Green Mountain Range has been very inaccessible, and when fires occurred far up in the mountains it was a most difficult matter to get fire fighters to the district. This condition has been greatly changed for the better during the past year by the construction of over one hundred (100) miles of trail along the Green Mountain Ridge. This is one consecutive trail located as near the top of the ridge as possible, and at the same time a maximum grade of 15 per cent is held to in most cases. It is the plan to have other trails run up to the highest peaks from this main trail, and thus allow patrolmen to act in the capacity of both lookout and patrolman. Telephone lines will also be run up from the main lines in the valleys, thus allowing the patrolmen to notify quickly the town fire wardens in case fire is discovered. By such a trail a crew of fire fighters can quickly get in to a fire in this mountainous region, where before it was a very slow and difficult matter.

In summing up the progress of forestry, especially along the lines of fire prevention, Vermont seems to be well among the leaders in this work. As a result, the State has this year suffered very little loss from widespread forest fires, although it has been one of the dryest seasons on record.

GOOD WORK IN WISCONSIN

STATE FORESTER E. M. GRIFFITH, of Wisconsin, in reporting on the fire situation in that State says: "Our fire season is not over and will not be until the snow comes to stay, probably the latter part of November. Fortunately this has been a rainy season and with the exception of June, when it was very dry, we have practically had no fires of any consequence. Our forest reserves are now divided into districts, with a forest ranger in charge of each district, and in June, by means of our lookout towers and system of telephones, they were able to quickly detect the few fires which started and to promptly extinguish them. We have pushed the work of completing our system of roads, fire lines, etc., and are getting the forest reserve into such shape that I think we can handle any forest fires that may occur.



FORM 1

State Board of Forestry

NOTICE

All Hunters, Trappers, Fishermen, Campers, Surveyors, Land Locators, Travelers or other persons, are required by Section 4405a, Statutes of 1898, to totally extinguish ALL FIRES BUILT BY THEM before leaving them and to use all possible precautions to prevent the escape of the fire from their control at any time.

A fine of not more than 50 DOLLARS OR IMPRISONMENT IN THE COUNTY JAIL not more than six months for each offense is imposed by said section for failure to comply with its provisions, and all violations will be vigorously prosecuted whenever detected.

E. M. GRIFFITH,
State Forester.

NOTE--Any person who destroys or removes this warning notice is punishable by a fine of from $15 to $100, or by imprisonment from 10 days to 3 months, or by both fine and imprisonment.

EFFECTIVE FIRE WORK IN MICHIGAN

THE Forest Fire Protective Department of the Michigan Hardwood Manufacturers' Association, with headquarters at Gaylord, Mich., and under the active direction of Chief Warden Charles L. Hickok, has done very effective work during the past season. There have been a number of fires, but by an efficient patrol system the losses were kept down to a small figure. Thomas B. Wyman, the secretary-forester of the association, says:

"One of the most encouraging features of association work is the fact that in a number of instances fires have been reported to the wardens after having been effectively put out by the party reporting the fire. This is in line with the efforts of the association, through its educational work, to gain the cooperation of all woods travelers to the end that they will personally put out any fires which they may discover. Few fires burn for any considerable time without being discovered, and when each man becomes a voluntary fire warden, destruction by fires must necessarily cease."

The association has distributed circulars, illustrated by the fire scene at the head of this article, and bearing the following pertinent facts and figures:

Forest Fires Can Be Prevented

BY THE PATROL SYSTEM.

Michigan's Loss by Forest Fires for a Period of Ten Years Ending 1911 - - **$20,000,000**

1,000 Feet of Timber on the Stump worth - -	$ 5.00
1,000 Feet Harvested and on the Market - - -	25.00
1,000 Feet Destroyed by Fire before Harvesting Means a Community Loss of - - - -	20.00
1,000,000 Feet Destroyed by Fire, Community Loss,	$20,000,000

Lives and Property Lost! — Homes and Towns Burned!
Thousands of Men out of Wages and out of Food!
Fear and Panic Everywhere!
Poverty! — Distress!

THE CAUSE - - FOREST FIRES

FOREST FIRE WORK IN NEW HAMPSHIRE

By Philip W. Ayres

Forester, Society for Protection of New Hampshire Forests

MORE fires extinguished and fewer acres burned over than ever before, is the record of the past dry season in New Hampshire. The State forester, Mr. Hirst, has done excellent work, acting under a fire law passed four years ago in the administration of Governor Robert P. Bass. Besides the State appropriation, and fire wardens in all the towns throughout the State, Mr. Hirst has had active assistance in two directions:

1. He has had the use of $8,000 from the Federal Treasury under the Weeks Act, practically duplicating the New Hampshire appropriation for fighting forest fires.

2. He has had the active co-operation of the Timberland Owners' Association. This society taxes itself to the extent of $10,000 a year, practically all of which is expended under an able forester in co-operating with the State to suppress forest fires. This additional protection is given in the northern heavily timbered portion of the State.

As the work in New Hampshire is progressively efficient, it is worthy of study, and it can be recommended for other States having similar conditions. How is it that by the expenditure of $25,000 a year, timber roughly valued at $150,000,000 can be successfully protected from fire? This amounts to insurance at a rate of 16-100 of 1 per cent per annum. Where can you get cheaper insurance?

Under our law every town has a chief fire warden, and one or more deputy wardens, according to the size of the town and the amount of timber to be protected. This total force of about 800 forest fire-fighting officers, captains of crews in time of fire, have the duty to proceed at once to forest fires and to extinguish them. Usually they succeed with credit. They are organized under four district chiefs, and the whole force is directed by the State forester. We have district meetings of these men in the winter time when the snow is on the ground, to which their expenses are paid by State appropriation, in order to talk over matters and compare notes. These meetings give enthusiastic personal interest to the whole work. They enable the State forester to unify his system, and render it elastic.

Town forest fire wardens and their deputies may be ordered out to patrol the woods in dry seasons at the State forester's discretion, and throughout any dry season the patrol is practically on all the time. Thousands of warnings are given, and practically every camper, hunter, fisherman, or tourist that comes into the woods is instructed about careless dropping of matches, and about making and extinguishing camp fires. The fire warden does this, not officiously, but in a neighborly way, and if fire breaks out he summons adequate help by telephone.

It is unlawful in New Hampshire for anyone to make a fire in the woods from April 1 to November 1 without the consent of the fire warden. This was thought very hard at first by some of our people, but its enforcement is becoming easier, and in a few flagrant cases prosecutions have brought fines. Our wardens have the right to arrest without warrant if the laws with regard to setting fires are not obeyed in the woods. They may summon any man between the ages of sixteen and sixty to assist in extinguishing fires, and each is liable to a fine if he cannot give good excuse for declining. The fire warden can seize horses, wagons, and tools, for the purpose of extinguishing forest fires. As a matter of fact, however, we find that a good many people are not capable of fighting fire. We

have, therefore, a growing inclination to call out certain men of tried efficiency in each village whenever their services are needed. Their services are paid for by the town, that later collects one-half the amount from the State Treasurer. The State will duplicate payments by the towns to the extent of $8,000.

On our mountain tops we have 24 fire-lookout stations. Each of these has a watchman in dry times. Each commands a wide area, overlooking many thousand acres, and is connected by telephone. Each watchman has maps and field glasses, so that if a smoke shows up anywhere he can at once notify the fire warden in that town. He also notifies the district chief. Nearly every one of our stations has a record to its credit of fires extinguished. It sometimes happens that smoke hardly has time to get above the tree tops before the fire warden is called upon to extinguish the fire. Of these stations ten are owned and operated by the State at a cost each of from $250 to $350 per annum. Five are owned and operated by the Timberland Owners Association; four are owned by private parties but operated by the State; and five are temporary stations, used only in the driest weather. To be sure, these stations become useless in time of great smoke, but for the most part they are of greatest possible advantage, and we would not think of giving up the system. We need six additional permanent stations to be operated throughout the summer period when fires occur, and five additional temporary stations for seasons of excessive drought.

As the railroads cause more fires than any single agency, it is a satisfaction to record that the Boston & Maine Railroad, which controls nearly all the lines in New Hampshire, is co-operating to prevent fires. Two hundred and fifteen of their section men have been made forest-fire wardens under the State Forester, and thirty more are to be appointed. These men have the same authority as other forest fire-wardens. The railroad has found that its payment of damages is so very great that it pays to prevent fires. The co-operation between the State and the company is cordial, and a good start has been made.

A new law was passed by the legislature last winter, giving the railroads the right to enter on private property along their rights of way to clear useless underbrush and inflammable debris. It also requires all persons who conduct logging operations along railroad lines to clear up their slash for a distance of 25 feet adjoining the railroad's right of way.

We are perfectly aware that our system is imperfect. The States of Michigan and Wisconsin are ahead of us in having better laws for clearing up slash. New York and other States are ahead of us in the matter of inspecting railroad locomotives, and in securing the use of oil-burning engines in the forest district. Some of our hillsides are frightful sights where repeated fires have rendered the soil barren forever, or until another ice age shall bring us a new soil and a new fertility. Massachusetts is ahead of us in using fire wagons equipped with apparatus. But we in New Hampshire are pleased with the efficiency thus far attained. The State Forester has hold of his men, and we believe that our New Hampshire people are disposed to make further improvements through the next legislature.

One of the largest forest nurseries in the United States is conducted by the Forest Service near Haugen, Montana. It is known as the Savenac Nursery and has a capacity of 4,000,000 *young trees a year.*

The forests of Norway are mostly in private or municipal ownership, the nation owning 28.5 *per cent of the total forest area. The National Forests of the United States occupy only about* 20 *per cent of the total forest area of the country.*

RHODE ISLAND'S LOSS IS $9,000

By Jesse B. Mowry, *State Forester*

FROM January 1, 1913, to September 1, the wardens of Rhode Island have reported 46 fires which burned 6,720 acres, largely sprouts and brushland previously burned over, causing a damage not far from $9,000.

Since the first of May the season has been so very dry that the damage would have been much greater had there not been a large force of forest wardens, 100 in the State, connected by telephone and equipped for the work. Prompt work extinguished a considerable number of fires before they had burned over a half acre of ground. There have been an unusual number of deep-soil fires difficult to extinguish from lack of water. The wardens are being directed to give attention to the location of brooks and springs in the woods, and in regions of scanty water supply, to dig shallow wells and bury barrels and tanks for the purpose of gathering the slow seepage and the flow of small rivulets; thus providing a handy supply of water for pails and fire extinguishers in case of fire.

Fire fiends, loafers, and suspects, looking for wages from fires, may be checked by the pay card recently devised by Hon. Frank F. Davis. This card is to be distributed where necessary by the warden at the fire to all reliable helpers.

WHAT IS NEEDED IN OHIO

By Edmund Secrest, *State Forester.*

OHIO has made only a beginning in the matter of fire protection. The intent of the present laws on the statute books is good, but their scope is limited, and they do not imply all that is essential to a well-developed policy. The State is entirely without a body of administration. The authority at present is in the boards of township officials, and the laws are almost never enforced. The warden system is not in force. The township trustees are authorized to call upon the eligible male inhabitants to help extinguish fires, but this power is rarely exercised.

The State forester at the Experiment Station has compiled the laws relating to fire protection, and has given as much publicity to them as possible. Posters have been issued and distributed throughout the State in post-offices and other public places, and to private owners, and we believe some good has resulted.

There are in Ohio approximately 1,500,000 acres of timber lands in need of fire protection. They lie in eight or ten counties in south Ohio, and are for the most part hardwood. For this reason a fire warden system would be easy of operation and has been agitated by the forestry department and we believe will be established before long.

It is said that 90,000,000 *broom handles are used annually in the United States; one for each man, woman and child.*

The lands burned over during the terrible fires on the Idaho National Forests in 1910 *are now largely covered with a thick growth of young tree seedlings, by natural reseeding.*

COLORADO HAS SMALL LOSS

By G. B. M. Stone, *President Colorado State Forestry Association*

IN the matter of forest fires, the past summer, Colorado met with but little loss. The season was unusually favorable. The Forest Service was most effective in reducing the fires to a minimum. Since its organization the annual loss in Colorado has been in no way comparable with the yearly devastation before the forest reserves were put under the care of the service.

The State law in regard to forest fires is good, but provision for its execution has been inadequate, nor has there been a public determination to secure proper enforcement. The people are now beginning to wake up to the importance of forest protection.

There is a movement on foot to give more attention to the subject of prevention, and make "carelessness" on the part of "campers" a crime and punishable by severe penalties. No State has been afflicted with such armies of campers as Colorado, and by their carelessness more fires have been started and more square miles of timber have been burned than from all other causes. The State is now coming into line to co-operate with the Forest Service in forest-fires protection work.

A MINIATURE NATIONAL FOREST

A MINIATURE model of a Rocky Mountain national forest has been built by the Forest Service. The model measures five by six feet, and is on a scale to show an area of about four square miles.

The model contains a ranger station, a government tree nursery, trails, roads, and bridges built by the Government for greater facility in travel, and particularly for the purpose of making every part of the forest accessible to fire fighters and fire-fighting equipment. It has fire-lookout towers; telephone lines, which enable the forest officers to give quick news of fires and to facilitate the transaction of other forest business; and fire lines along the mountain crests kept clear of inflammable material, so that fire may not easily pass from one part of the forest to another. Certain areas show homesteads developed under dry farming and under irrigation, and one shows a tract which is being logged under Government regulation.

Th model is designed primarily to show the ways in which the national forests are useful to farms within or near their boundaries.

It indicates that the farmer on the irrigated land has been able to secure his small patch of land within a national forest because his strip was better suited to agriculture than to forest growth. He obtains all the wood he needs for his domestic use free and can purchase additional wood at a reasonable price from the Government. He grazes his milch cows on the forest range without cost, and there is available for his use abundant summer range where he may graze, at a small cost per head, sheep and cattle which he may carry over the winter on hay and fodder raised on his own farm.

Grazing cattle are shown on the model at about the size of a grain of rice, and sheep in proportion.

On the area devoted to dry farming, it is shown that tree growth protects the land from drying winds.

A typical power stream, from which water is also taken for irrigation, is shown running through th forest. Running water is used in the model, and adds to the picturesqueness of the exhibit.

WHAT HAS BEEN ACCOMPLISHED IN FIRE PROTECTION ON THE NATIONAL FORESTS

By H. E. Woolley, *Forest Examiner*

IT is considered by close students of the fire question on the national forests that the annual burning of one acre out of every one thousand under administration is the minimum degree of efficiency with which the Forest Service, under present conditions, may reasonably be expected to be satisfied. Nor would it seem that less should be expected, as even this standard would, if all the land burned over were producing timber at the rate of a mature crop in one hundred years, result in the burning of ten per cent of the forest before it reached maturity. Surely good business would not be satisfied with a sacrifice to the fire god of more than a tithe of the forest crop!

The average attained for eight years of administration of the national forests is 4.916. This is for the period from 1905, the date of the establishment of the Forest Service, to 1912. The record for this time is as follows:

1905	3.265	acres	to	1,000
1906	1.078	"	"	"
1907	.92	"	"	"
1908	2.46	"	"	"
1909	1.86	"	"	"
1910	25.868	"	"	"
1911	2.65	"	"	"
1912	1.23	"	"	"
Average	4.916			

It is unfair to draw comparisons between the standard attainable in the United States and the accomplishments of foreign countries along these lines, owing to the great variation between conditions here and there, yet to show the possibilities in fire protection that may be attained under favorable conditions, it is interesting to note, for instance, that Prussia attained an average efficiency record of .2 acres to every thousand for the period from 1868 to 1895, while Bavaria established a record of .075 between 1877 and 1881. In making this comparison, it should

SHOWS LOOKOUT TOWER ON McGOWAN'S POINT, SHOWING NEED OF A HIGH TOWER BECAUSE OF HIGH TREES SURROUNDING.

Those trees that are near will be felled to prevent them damaging the tower if blown down in a windstorm.

be kept in mind, as one of the main variations in conditons, that a forest ranger on the Federal forest looks out for approxmately 100,000 acres, while a forest officer of equal rank in Ger-

LOOKOUT MAN AT BLACK BUTTE USING HELIOGRAPH.
Two mirrors in use. Shutter being held open by buckskin thong. (Use of heliograph on the California National Forest, summer of 1912.)

many is responsible for only about 700 acres.

THE DIFFICULTIES.

In guarding the national forests from fire, in order to bring their control within the degree of efficiency demanded, there are many difficulties to be overcome. One of the most important of these, and one sometimes overlooked or but slightly appreciated, arises from the fact that the area to be administered embraces over 138 million acres of land, exclusive of private lands within the forest boundaries, the purchase areas of the Eastern States, and the national forests of Alaska. This area is divided into 160 administrative units or forests containing on an average nearly one million acres each. The greater part of this area embraces rugged, mountainous regions including the crest of the main divides of the Rockies, the Cascades, and Coast Ranges. Vast areas are either wholly inaccessible or are but poorly divided with means of communication.

Preliminary to the adoption of any well defined plan for the protection of forest land of this character there must of necessity be considerable effort expended in opening up the remoter regions to travel and adequate communication. The efforts of the Forest Service in this direction mark one of the most definite accomplishments so far. The extent to which it has been done will be considered at a later place in this discussion.

Another element of difficulty in fire protection arises from the great variety of causes of forest fires which make the task of preventing fires from starting extremely complicated. These causes are divisible into two main classes, namely, immediate and contributory:

The immediate causes have been divided into (1) preventable, caused by man; (2) generally unpreventable. Preventable causes are further divided into (a) intentional and (b) unintentional. Intentional causes are "incendiary" and may arise from maliciousness or

FIRE FIGHTERS AT WORK CONSTRUCTING A FIRE LINE WITH SHOVELS AROUND A SURFACE FIRE.
Fire is burning down sluff and brush on an old burn. Oregon National Forest.

wilful negligence, contempt for law, and attempt to cover crime, or to drive game. Unintentional causes may arise from (aa) sparks or ashes from railroads or sawmill engines or (bb) from uncontrolled fires such as start from brush burning, campfires, and a number of miscellaneous minor causes, such as sparks from chimneys, blasting, electric wires, etc. Generally unpreventable causes are divided into (a) lightning, (b) spontaneous combustion, either chemical or mechanical, (c) unknown, which include fires the causes of which are not determinable with reasonable certainty.

Contributory causes arise from (1) forest conditions, (2) climatic conditions. Forest conditions contributory to the fire hazard arise (a) from natural conditions such as the presence of inflammable duff, humus or dense undergrowth, or (b) from conditions resulting from acts of men, such as arise from artificial litter on the forest floor in the form of slash. Both of these conditions can be regulated, by proper management. Climatic conditions which increase the fire hazard consist of drouth, hot seasons, hot waves, and warm winds.

This condensed outline of the causes of forest fires is necessary, since it makes apparent the vulnerable places of attack in the war of prevention. Obviously, the unpreventable fires starting from lightning or other natural causes, and including the unknown, are beyond the power of man to avoid. The best that may be expected in respect to them is to minimize their effect by vigilant effort. According to the statistics about 38.2 per cent of forest fires are in the unpreventable class. About 17.5 per cent of these start from lightning. The problem presented by this class of fires is the same as that in connection with the discovery and suppression of preventable fires and will be given consideration later on.

The greatest problem connected with the fire situation on the national forests arises from the remaining 61.8 per cent of preventable fires. The task with respect to these is two-fold in character and consists in devising means (1) for the prevention of fires, (2) for the

FOREST OFFICERS FIGHTING A FOREST FIRE ON DISTRICT 8 NEAR SHOSHONE.
Holy Cross National Forest, Eagle County, Colorado.

quick discovery and extinguishment of those that start. These tasks are interrelated and depend upon (1) public sentiment, (2) proper organization of the forest, (3) adequate supervision of the forest, (4) adopting facilities for fighting fires.

THE ACCOMPLISHMENTS.

The accomplishments of the service along each of these lines is marked and can be pointed to with no little pride, though it is admitted that the protective plans have not as yet been brought to a state of perfection by any means. Still, one of the chief accomplishments of the service is found in the fact that definite plans for the protection of practically all forests having a serious fire hazard have been formulated and are being pressed to completion as rapidly as circumstances will allow.

A long step forward has been taken along the road to the ideal standard of efficiency in fire protection by the results that have followed from the attempts to create an interested public sentiment. To secure this an extended campaign of education has been conducted. The first efforts along this line consisted of little more than posting the forests with fire warnings and notices to campers and through suggestions to individual users within the forests. As a result of the stimulation of interest in the fire question which followed from the disastrous fires of 1910, this phase of the fire problem, as well as every other aspect of it, was given a strong impetus. Efforts to arouse public interest and a sense of responsibility were renewed with vigor. The wide publicity given the fires themselves and the terrible consequences in loss of life and property had a tremendous effect in awakening a lethargic public to a realization of the dangers of forest fires. Nor was this awakened interest allowed to follow the natural tendency and die out shortly after. The opportunity was seized

FOREST OFFICERS READY TO LEAVE A TOOL BOX FOR A FIRE.
Arapaho National Forest, Colorado.

by the Forest Service with alacrity and every effort made to convert the momentary interest into a permanent public realization of the important part the public generally and the forest users in particular play in the fire situation.

Many means for reaching the public mind were adopted. Numerous large-typed and red-lettered posters were furnished the forest rangers with which to post the national forests. Letters were sent to representative members in and adjacent to the forests, including hotel proprietors and summer resort keepers, calling attention to the annual fire loss and asking their co-operation in fire protection and suppression. In each letter was given the location of the nearest ranger district with the name, address and telephone number of the ranger in charge. Telephone companies were induced to insert in their directories suggestions regarding campfires and instruction as to reporting fires when discovered. Many railroads also inserted warnings in their summer time tables. These and numerous other means were adopted for keeping the public conscious of the fire danger.

The results of this campaign, which are still going on, are extremely encouraging. It is reported that in the Northwest, where the heaviest timbered forests are located, almost every agency, eithr public or private, is lending assistance. Co-operative agreements for the patrol of the timber lands have been entered into with States, railroads traversing the national forests, owners of large bodies of timber in and adjacent to the forests, and associations of lumbermen. Several railroads have been induced to use oil-burning locomotives in heavily timbered districts, and many are clearing their rights of way of inflammable material. Nor is this spirit of co-operation confined to the larger interests. Grazers and other campers have on the whole manifested a disposition to be careful with campfires and take a lively interest in watching out for fires and either extinguishing them themselves or notifying the forest rangers of their location.

FOREST SERVICE MULE PACKING, FIRE TOOL BOXES.
Delta County, Uncompahgre National Forest, Colorado.

KIOSK, SHOWING CONTENTS DISPLAYED; SIX SHOVELS, TWO AXES, TWO MATTOX, AND A SPECIAL SHOVEL BRACKET.
Logan, Cache County, Utah.

THE MORE ELABORATE TYPE OF TOOL BOX, WHICH IS IN USE ON THE GRAND CANYON DIVISION.
Four of these boxes are located between Hull Tank and Dripping Springs. Tuscayan National Forest, Arizona.

It is needless to suggest that this almost universal manifestation of interest is bound to prove a most important factor in helping to keep the fire record within the standard of efficiency demanded. It is too early yet to prove much in this respect by statistics, as but two seasons have passed since the campaign began with so much earnestness, but it is certain that if the public interest can be kept up to its present pitch the records will soon show permanent decrease in the number of fires starting from the preventable causes.

Another accomplishment results from the organization of the forests for protection, by which is meant the establishment of such conditions within the forests as will reduce to a minimum the chances of fires starting. To accomplish this the forests have been materially improved by the development of systems of roads, trails, telephone lines and lookout stations; effective organizations for protection, supervision and fire fighting have been established; and methods adopted for the proper disposal of slash from logging operations, and the proper control of insect infestation in order to free the forests from an accumulation of debris and dead, inflammable timber.

In the way of improvements there have already been constructed within the national forests about 16,000 miles of trails, about 15,000 miles of telephone lines, about 2,000 miles of roads, 1,500 buildings for the accommodation of rangers, several hundred lookout stations, as well as many other minor improvements. It is estimated that these figures represent about one-third of the amount of improvement necessary to complete the primary protective systems of the national forests.

In clearing up the forests and keeping them free from slash and other material which adds to the hazard, it would be clearly impracticable to attempt to work over the vast areas of timberland within the forests and rid them of the natural accumulation of litter and dead material with which many tracts are strewn, because the cost of such an undertaking would be quite unjustifiable under the present stage of forest management of the national forests. It is practicable, however, to attempt to prevent a further accumulation of debris in the forests from timber sales and other sources. This is being done very effectively in most cases. The timber sale regulations require the proper disposal, under the direction of the forest officers,

of all slash and litter from new cuttings either by piling, lopping or scattering the brush and by such periodic burning as conditions in each case warrant. As a result of this effort areas covered by Forest Service timber sales as a rule present very little fire hazard. Nor is the effort in this respect confined to the proper disposal of brush on Government lands. Considerable interest has been stimulated by the example set by the Government among individual operators and companies cutting on private lands in and adjacent to the national forests. The result is that many private holdings, which, under the old methods of cuttings would have been left as dangerous fire traps are now cleaned up and present quite as secure an appearance as do the areas supervised by the Government. During the year 1911 there were 267,107 acres of private timberland burned over within the exterior boundaries of the national forests, as against 21,627 acres in 1912.

Comprehensive efforts to control insect infestation have been organized in three districts, namely, 1, 6 and 5, where specially trained men have been assigned to the task of supervising the suppression of infestations reported by the local forest officers. Technical information regarding the life history of the insects on which these control measures are based is furnished by the Bureau of Entomology.

Adequate supervision of the national forests devolves immediately upon the local forest officers, consisting of each forest demand. There are at present all told 1,571 men making up the permanent force of the national forests. During the fire season this regular force is supplemented by temporary forest guards who are assigned to assist the regular rangers for protective work. This force of men forms the backbone of the service in the protection and administration of the forests. The assemblage and training of this band of fire fighters marks one of the best accomplishments of the service. It has been a slow process owing to the fact that there was no available source from which specially trained men for fire fighting might be drawn. It, therefore, became the duty of the service to assemble and train its own force. Experience has been their great teacher. While some bulletins have been issued for the general guidance of the men in fire fighting, it is found that none but men of actual experience are able to do

HARNEY PEAK FIRE LOOKOUT STATION. 7,242 FEET.

Officer with telescope locating fire. Heavy table for maps, iron legs fixed in solid rock. Custer County, Harney National Forest, South Dakota.

effective work, when confronted with the actual responsibility of coping with a real live forest fire. With the present force of rangers on the ground, however, and most all with some experience in practical fire fighting, it is found that the task of conquering a fire is much simplified as the efforts of the raw men can be intelligently directed to the best advantage. And this, by the way, constitutes one of the chief duties of the forest officer in suppressing big fires. Space will not permit a detailed account of the many interesting plans which have been devised for the assistance of this force in its patrol work for the discovery and suppres-

sion of fires. Suffice it to say, each forest is organized according to the needs of its individual conditions, such as the size of the tract, character of the forest, difficulties of communication and of securing help in cases of emergency.

Many important facilities have also been adopted for fighting fires after their discovery. These consist in plans and arrangements with nearby ranchers, millmen, railroad section crews, etc., whereby extra men may be rushed to the scene of the fire in the quickest possible time; in the proper equipment of the forest with tools and implements for the suppression of fires; definite plans for the organization of the crew and for its maintenance while on the fire line, and the assemblage of skilled help to supervise the attack.

Detailed plans along these lines have been worked out to a high degree of efficiency on a great many of the more important timber forests. Signaling devices of various kinds have been adopted for rapid communication between lookout stations and other vantage points upon the forests. These consist of flags, smoke signals, and heliographs. Lookout towers have been equipped with powerful telescopes and various other sighters. Tool boxes and supplies have been cached at convenient intervals over the forests and their location shown prominently on tourists and other maps. Pack trains have been purchased and equipped by the Government for carrying provisions to fire guards to save time by enabling them to remain constantly on patrol, rather than spend time at crucial periods going to town for supplies.

These and many other means resulted in the location and suppression in their incipiency of about 2,000 fires every year. It is reasonable to suppose that a great many of these fires would have grown into destructive conflagrations but for their quick discovery by the ever-ready forest officers.

If such are the accomplishments of the Forest Service in the comparatively short period of eight years of administration, we may certainly expect a vast improvement in fire protection at the end, say, of the first quarter of a century of Forest Service control. By then it must certainly be possible, appropriations and other contributing elements continuing favorable, to reduce the standard of efficiency much below the mark of one in one thousand.

WASTE FROM DESKS GOES INTO BRUSHES

WASTE wood in the manufacture of school desks is now being used for the backs of cheap brushes, according to the statement of the Forest Service.

A large manufacturer of school desks in Michigan had a considerable amount of waste material in sizes which were too short to enter into the manufacture of the smallest desks, and could not be utilized further with his machinery or in his line of work. This material was all hard maple, in pieces an inch thick, a foot or so long, and about three inches wide; for a long time it had been consigned to the waste pile and sold as firewood. This waste amounted to from one thousand to fifteen hundred board feet each day. A nearby manufacturer was using practically this quantity of maple, which he was sawing up into small pieces for making the backs of cheap brushes.

Members of the Forest Service, investigating methods of eliminating factory waste, conceived the idea that the blocks used by the brush factory could be readily secured from the waste of the school-desk manufacturer, and on this basis got the two together. Arrangements were made so that the brush manufacturer now places orders with the other firm for its raw material, and what was formerly waste is now a source of profit.

DYNAMITE IN FOREST FIRE FIGHTING

By Warren H. Miller, M. F., *Editor Field & Stream.*

(Illustrations by the Author)

IN the June issue of American Forestry I published a few thoughts on forest-fire prevention, and incidentally treated some of the more advanced methods of fighting fires, among which was mentioned dynamite. At that time all experiments were in a tentative and inconclusive state. The idea looked "good." I knew from personal experiments what dynamite could do in farm-ditching and tree-planting operations. It is the only way to get in the trees, particularly when labor is scarce, as it usually is, for with dynamite one man unaided can plant a whole orchard of young trees, at infinitely less labor and at the same expense as hand-digging, and the results in increased tree growth are wonderful.

The cartridge used is the 20-per-cent dynamite, with match fuse. The cost is about 4 cents per tree, half a cartridge being used for each hole.

Incidentally I might add that the latest use we have made of dynamite is to clear the farm of woodchucks. Br'er Woodchuck usually holes up in the center of his intricate burrow system when chased by dogs, but a dynamite cartridge exploded over his sanctum, as deep in the ground as it can be driven, usually gets him.

For farm-ditching and trenching these same cartridges are used, set 28 inches apart, about 2 feet down, and the row is set off simultaneously with electric fuses and a discharge magneto. It opens up a trench two feet deep and seven feet wide, at a cost of 4½ cents per running foot. Of course fuses can be used for trenching and the effect will be almost as good, but there will be considerable clearing out to do, owing to the tendency of the cartridges to form holes or pockets instead of the clean trench blown by si-

Photo by Warren H. Miller.

VIEW OVER THE BURN FROM THE CAT MOUNTAIN LOOKOUT STATION.

Photo by Warren H. Miller.
THE CAT MOUNTAIN LOOKOUT STATION, BUILT BY THE RANGERS.

multaneous discharge. However, using minute fuses and a good gasoline torch, one should ignite forty fuses in a minute, which would put him some 90 feet away from the first cartridge by the time it goes off, which is ample for safety, so that there is no reason why a line of indefinite length could not be set off by one or two men.

In all these operations the cartridge is sunk in the ground by simply jabbing a hole with a crowbar and tamping some loose soil down over the cartridge after dropping it in. It was this simplicity and quickness of placing the cartridge which led me to inquire why it could not be used for emergency fire-fighting, and I wrote the Du Pont Powder Company asking for data on what experiments they might have already carried on along these lines. Their reply was that the only work that had been done so far had been in the palmetto country of South Carolina, where the cartridges had been placed end to end, running the cost up to a prohibitive point except for this special work. Otherwise the results in clearing the land of palmetto roots had been successful. The palmetto experiment was hardly fair, however, as every forester knows the villainous system of underground root propagation that the palmetto rejoices in, making the soil

one interlacing mass of tough roots as thick as one's arm.

My proposal was that, in ordinary forest duff, a line of 20-per-cent cartridges could be depended upon to open up a trench instantaneously, and as it could be laid at the rate of ten feet a minute, it would be valuable as an emergency means to head off a fire which was threatening to get by a rake-and-shovel fire line before the work on the latter could be completed. Let the fire-guard foreman have a set of one hundred cartridges in the tool cache, all wired up, ready for just such an emergency. Supposing a fine natural line of defense to have been selected and nearly completed before the fire arrives, all excepting a gap of, say, two hundred feet. Now it is essential to patrol the entire length of the line already raked, so that it is not well to concentrate all hands on that last two hundred feet; but the foreman and one helper can take care of it with the dynamite cartridges in twenty minutes, the helper driving in his crowbar about a pace apart, and the foreman following with his bundle of cartridges, unrolling the fuse wire and dropping them in as he goes. A single blow of his heel will tamp them in sufficiently.

Photo by Warren H. Miller.
GEORGE ——, THE STATE LOOKOUT.
A characteristic type.

This very proposal was worked out by the Du Pont representatives before the Eastern Foresters' Association at Wanakena, N. Y. I was the guest of the Association and witnessed the demonstration. The evening before, in the Pullman going up from New York, I found myself very much in the minority on the dynamite idea. The Foresters, in a body, were "from Missouri"; they wanted to be shown: it might work out all right on the farm, but in loose forest stuff, with roots interlacing all about—why it would simply expose the roots to the blaze and do more harm than good! Well, somebody's got to be in the minority if a body's going to start anything, so I returned the merry jests with appropriate gibes and the subject was laid on the table.

Photo by Warren H. Miller.
THE TELEPHONE BOX AT THE CAT MOUNTAIN LOOKOUT STATION.

The demonstration was made in a dense undergrowth, coming up in an old burn, in the experimental tract belonging to the New York State College of Forestry of Syracuse. A fine place

Photo by Warren H. Miller.

AT THE HEIGHT OF THE EXPLOSION OF A TWO HUNDRED FOOT TRENCH OPENED UP WITH DYNAMITE.

An example of what may be done in forest fire fighting.

for a brush fire, dead and down trees all about; thick, tangled, matted bushes, plenty of dry duff. A fire line two hundred feet long was chosen and cartridges planted approximately two feet apart. Not hurrying, the work was done in twenty minutes. The State rangers were on hand with rakes and shovels, also a barrel of kerosene and sprinkling pots to give the fire a good start. They thoroughly saturated the entire length of the fire line with kerosene, making a twenty-foot path of oil-soaked brush.

Then they touched it off; and immediately we had a roaring fire, ten feet high. Standing dead trees caught like torches, sparks and blazing brands flew aloft, and it began to look as if we had "started something" in earnest.

"Are you ready!" called the Du Pont man. The Foresters retreated to points of safety, while three or four of us perched on a big down trunk and aimed our high-speed cameras.

Boom! A solid wall of duff two hundred feet long rose fifty feet into the air; the forest was dark with flying dirt, and it rained duff all over us. The explosion put that whole fire out as if a giant had blown fire from a match. At the height of it I snapped the camera and got view No. 1. The speed of the explosion was enough greater than that of the camera shutter to cause the rain of particles to take in streaks. View No. 2 shows the trench opened up immediately after the explosion.

As for the burning trees, twigs, and bark, nothing remained but a few smouldering embers, easily put out with shovels. The flying duff had combed every particle of flame from them, and all dead trees near the trench were overthrown.

In a body the Foresters hastened to inspect the trench. There it lay, two hundred feet of it, two feet deep, four feet wide,—six, if you included the clean embankment of mineral soil thrown up on both banks of the trench. Wherever roots crossed it they were torn in two, offering no obstruction to the shovelmen, who promptly availed themselves of all this loose dirt to bury smouldering embers here and there.

There is nothing like being "shown." After some little investigation and a few rapid calculations, the general consensus of opinion was that, while dynamite was a little more expensive than hand rake-and-shovel methods, it was undoubtedly an effective emergency means of stopping a forest fire at any threatened point, thus perhaps saving a long fire line already raked; and it therefore might become an exceedingly valuable adjunct in the tool cache of a protected forest.

One gentleman, a large Canadian holder, went so far as to propose its use as a fire trap in his forests, burying the cartridges at points where fires had periodically been set. With a fuse and cartridge properly protected against dampness and something readily inflammable at the upper end of the fuse, which might be automatically ignited by a passing fire, this scheme might work out.

The writer was anxious to have the Du Pont people demonstrate the ease with which a tree can be thrown by a single cartridge judiciously placed, for it often happens that a crown fire will get across a limiting stream if one or more trees lean out too far towards the opposite shore. Usually there is no time for axmen to fell such trees, but with a dynamite cartridge it is only the work of a few minutes. Drive a hole with the crowbar diagonally under the stump, opposite to the direction in which you wish the tree to fall, and touch off the fuse. There seemed to be considerable reluctance about trying this out, however, though the powder men were willing enough, and the remaining cartridges were expended upon experiments as to the effect of dynamite

Photo by Warren H. Miller.

SCENE IMMEDIATELY AFTER THE EXPLOSION OF THE TWO HUNDRED FOOT TRENCH OPENED UP BY DYNAMITE.

The foresters are seen inspecting the trench, and the air is still filled with the smoke and dust of the explosion.

if exploded upon the surface of the forest soil. These, of course, resulted in nothing conclusive, as the dynamite had nothing to lay hold of, simply blowing a shallow hole in the duff. No time is gained in not burying the cartridge as it is but the work of an instant to jab a hole with a crowbar. If these surface explosions had been tried out in an actual fire area they might have shown something of the force of the explosion in blowing out the flames from all burning wood in the vicinity, much as a powerful wind blows the flame from any burning stick, leaving nothing but the ember if the combustion has proceeded that far. This effect of dynamite should never be lost sight of, and is always to be counted on as a powerful aid in putting out the fire.

The Wanakena meeting of the Eastern Society of Foresters has doubtless been reported elsewhere in AMERICAN FORESTRY. Suffice to say that we guests, Messrs. Rafael Zon, of the U. S. Forest Service; Downing, of the N. Y. State Board of Education; Van Norden, of the Camp Fire Club, and the writer, had a most enjoyable time and got the full benefit of the informal discussion and interchange of ideas which always occurs when a congenial lot of professional men are thrown together for a few days.

I would, however, like to add a foot note on the Cat Mountain Lookout Station. This structure, shown in our illustrations, was entirely built by the rangers, is efficient and substantial, and is connected by Western Electric telephone direct to the nearest fire town headquarters. The lookout is a good type of the men that the State employs for this service, reliable, steady, well enough on in years to possess sound judgment; and he knows the whole area of mountain and forest surrounding him as well as if it were mapped out before him. The lookout commands a radius of some thirty miles, but the next nearest stations are too far away, in the writer's opinion, to be of much mutual assistance. The distance is too great for either wig-wag, heliograph or telephonic communication, and the system of cage-sighting by two or more stations to locate exactly a fire could not be used here with any accuracy. We had some discussion on the use of wireless, such as motor boats use, on such a station as this. A sending set of thirty miles radius is far cheaper than the same amount of double telephone wire, and single-wire circuit with ordinary dry-battery service is too unreliable to be of much value.

The Pennsylvania State College foresters reported having tried out a wireless scheme last year, without success.

Photo by Warren H. Miller.
A NEAR VIEW OF A PORTION OF THE 200-FOOT TRENCH OPENED BY THE DYNAMITE.

The experimenter was a man well up in his profession, and was given free rein to make the most of his opportunity, but his difficulty appeared to be in getting a good "ground." Even a wire carried down the mountain and "grounded" in a spring, supposedly in permanent "ground" with all the waters of the earth, did not give the expected results. After working on it all summer, the State did not feel like trying another man or renewing the experiments. Of course, the personal element may have entered here; another

man of a more inventive turn of mind might find a way out of the difficulty It seems pretty conclusive, however, that wireless communication between two isolated forest lookout stations, particularly where no such "ground" as a steel rail, or a pipe line, is to be had, is going to prove a troublesome proposition owing to the difficulty in grounding properly in rocky country.

In the Cat Mountain station the telephone was protected in a box at the foot of the tower, with a two-wire circuit leading out of it down the mountain. A windbreak of boards and burlap was the only protection provided for the lookout; his shack was down at the foot of the lofty rocky eminence that crowned the mountain. This house was substantial and comfortable, and he had a vegetable garden in full blast in cleared ground surrounding it. As usual with such men, I soon found something that interested us in common: the man kept bees, a subject which always interests me, and we were soon deep in the lore of Italian queens, eight-tray hives, and honey; and presently he brought some out, and it was mighty good stock! Lasted me all the way down the mountain. The only sweet that never cloys, and is, withal, nourishing and a good "stayer."

Mr. Van Norden gave the Foresters a talk on the Camp Fire Club's campaign for better forestry in New York State; for more rangers, more lookout stations, a State-wide fire law, etc., and explained the writer's plan for optional control of private lumbering in the Adirondacks, which passed the legislature last year but was vetoed by the governor for political reasons. This drew an interesting discussion of the forest tax problem in general. It is to be hoped that this year's work by the Camp Fire Club will result in a just system of forest taxation for New York, and the inauguration of the first practical scheme of State control of private lumbering that has been proposed, acceptable alike to the lumbermen and the conservation societies.

IN RECONNAISSANCE CAMP

By A. G. Jackson

The ranger sat on his office chair,
It was only a bench in a cabin old,
Whose roof of shakes let in the air
And whose side logs grey were deep with mould.

A cob-webbed window let in the light,
And more came in through the open door.
The looks of the place were a perfect fright
For dirt and paper wads strewed the floor.

A rusty stove in the corner sat,
A chain and transit were near at hand.
On a wooden peg hung a Stetson hat,
And a map which pictured the lay of the land.

The ranger's desk was of cedar shakes;
An aneroid lay with its face upturned.
There were maps and note books of various makes,
And on one corner some matches burned.

The ranger lighted his corncob pipe
And turned to his task with a gleam of hope.
He ran through the note books, arranged them right,
And then began plotting reconnaissance dope.

Contours and creeks with an easy stroke
He drew on the map to a four-inch scale.
The air around him was blue with smoke
Before he had dotted a mile of trail.

Beneath his pencil the township plat
Was soon marked up with a hundred lines
Showing upon a projection flat
The details of country and timber defines.

His pipe went out as the ranger wrote;
Absorbed in his task he spoke no word,
Until suddenly sounded a musical note,
The welcome call to the cook tent board.

The railroads of the United States use about 150,000,000 *wooden ties each year.*

Cadillac, Mich., is reported to be the foremost city in the country for varied and close utilization of forest products.

PORTAGE FALLS, GENESEE RIVER.
Typical flood with 30,000 cubic feet per second wasting.

CONSERVATION OF WATER

By WALTER MCCULLOH, C. E.

A SERIES of addresses by Walter McCulloh, C. E., on the Conservation of Water, recently, published by the Yale University Press, are attracting wide attention. They are the first addresses delivered in the Chester S. Lyman lecture series before the senior class of the Sheffield Scientific School, Yale University, and are provided for by the Chester S. Lyman Lectureship Fund established in 1910 through a gift to the Board of Trustees of the Sheffield Scientific School, by Chester W. Lyman, Yale College, 1882, in memory of his father, the late Professor Chester S. Lyman, for many years Professor of Physics and Astronomy in the school.

The volume comprises an introduction on the conservation of water and addresses on "Basic Data Essential to a Comprehensive Study of Water Storage," "Water Power," "Water Storage for Water Supplies, Sanitation and Irrigation," and "Water Resources of New York State," and is profusely illustrated.

In the introduction, speaking of the conservation of water, Mr. McCulloh says in part:

"The principal problems to be solved in this great national issue are: (a) Can the flow of rivers be regulated and floods prevented or controlled and (b), if so, by whom and through what instrumentality shall the control and regulation be effected? In this course of lectures, we shall endeavor to present the more important questions involved in the solution of these problems, and to discuss some of the proposed methods of procedure suggested by those who have given study to the subject. We shall discuss, also, the benefits to be derived by individuals, municipalities and corporations from a proper regulation of the flow of streams. The concluding lecture will relate to the water resources in the State of New York, as a concrete example of what can or might be done to acocmplish the practical conservation of water resources.

"Vast amounts of public moneys have been devoted by Federal and State authorities to investigations of floods and droughts and much technical study has been given to their causes and effects, but the campaign of constructive action may be said to be only just started in America. All of the investigations and studies on the subject of water conservation and stream flow regulation have led to one and the same conclusion, namely: That the construction of storage reservoirs, scientificallly located and operated, is the most effective and the only practical method of controlling the flood waters and of increasing the flow of the streams during the summer droughts.

"There is a well-established popular belief that floods and droughts are directly due, in a very large measure, to the cutting away of the forests on the hillsides and that reforestation would correct the damage already done, prevent the annual floods and materially increase the rainfall at the usual seasons of droughts. While it is undoubtedly true that the forest cover does have some beneficial effect upon the run-off after rainfalls have occurred, it is, however, not true that the forest would take the place of storage reservoirs as an adequate and effectual means of stream flow regulation. The effect of the forest is to retard the run-off by presenting barriers to a rapid flow of the water over the surface of the ground. Every tree trunk or fallen limb or dead stump presents an obstacle in the paths of the tiny streamlets as they flow down the hillside to the brooks, and the shelter of the trees affords a more uniform deposit of the snowfall and protects the snows against sudden melting in the springtime. Each of these conditions in its own way affords a better opportunity for the water to be absorbed by the ground mould and underlying porous earth.

RAQUETTE POND—RAQUETTE RIVER.
Timber killed by lumberman's reservoir—built without State control.

TUPPER LAKE—RAQUETTE RIVER.
Site of proposed Tupper Lake dam.

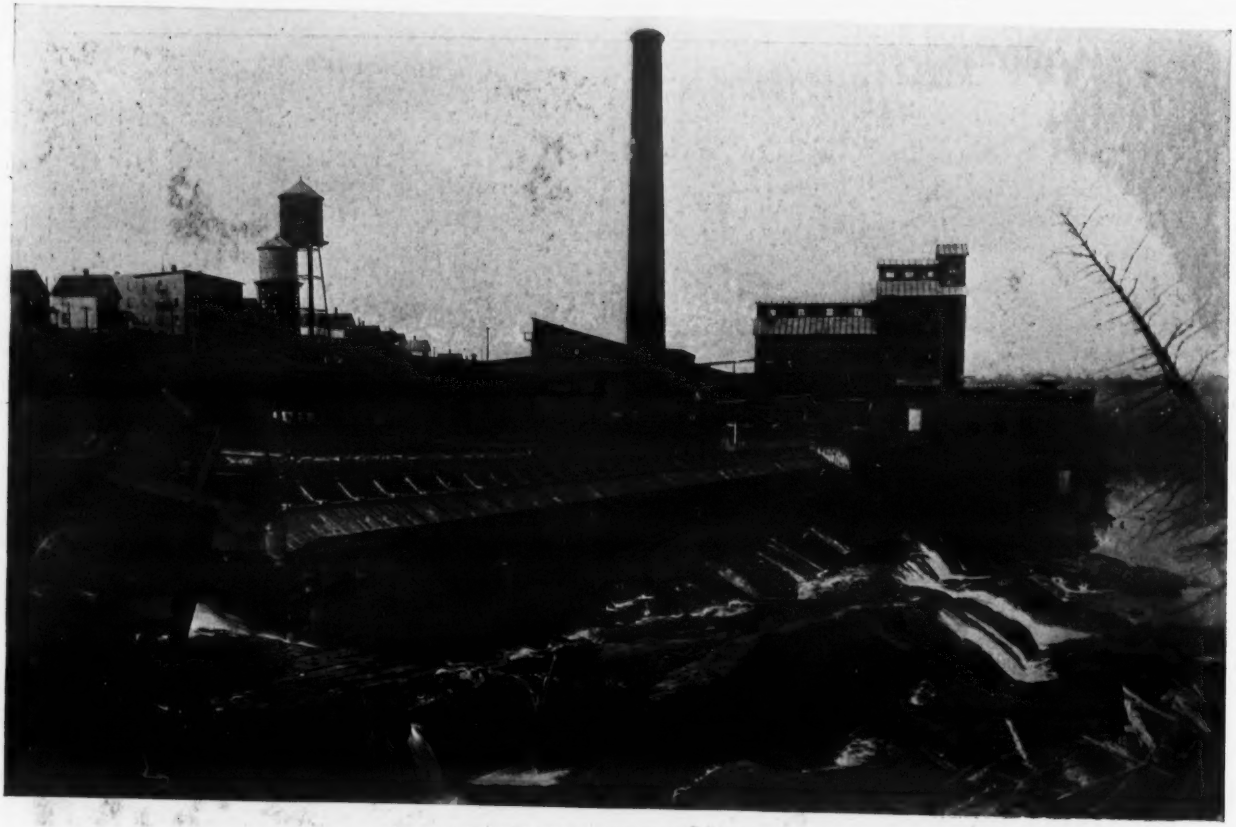
The earth, acting as does a sponge, absorbs and holds large quantities of water, which, obedient to the laws of gravitation, gradually flow through the soil to the low points in the valley and eventually find an outlet in springs and rills. The water absorbed by the earth does not amount, on the average, to more than 50 per cent of the precipitation. Of the other half of the rainfall, about 40 per cent finds its way into the streams and flows back towards the sea, while the remaining 10 per cent is taken up by evaporation and the vegetable growth. These natural actions have some effect in mitigating the severity of freshets and increasing the flow of the streams in the summer periods; but there are no authentic or reliable data at hand to show that the forests do increase the amount of precipitation. On the other hand, it has been shown with a reasonable degree of reliability that precipitation upon any section of the country is directly due to the geographical position with regard to large bodies of water, the prevailing direction of the wind and the altitude of the territory upon which the precipitation occurs. For example: In the Adirondack region in the northern part of New York State occurs the greatest annual precipitation in that State. The situation of this territory is immediately east of the Great Lakes, and the prevailing winds passing over lakes Erie and Ontario carry moisture to the higher altitudes of the mountains and there deposit the rain and snow. In this region, we have records of the extreme rainfalls for the State. Immediately to the east of the Adirondack Mountains, along the west shore of Lake Champlain, there is an area of low rainfall, from which we reason that the suspended moisture in the air has been deposited on the hills, and the winds, when they reach the eastern side of the mountains, are comparatively dry. Over this entire territory the forest cover is substantially the same, with perhaps the exception that, on the westerly side of the mountains beyond the foothills, the forests have been practically cut away and the land devoted to agricultural uses. The Rocky Mountains produce the same effect as the Adirondacks, but on a larger scale. The winds blowing inland from the Pacific deposit the rain and snow upon the high altitudes of the mountains, then pass further inland with comparative dryness over large territories of arid lands and so-called deserts.

"We do not argue from the foregoing facts that forest protection is not necessary, or that reforestation is not desirable; but we do maintain that these two proposed remedies will not prove adequate as a conservative measure with regard to water. Conclusive evidence is to be found in the geological formation of the valleys that floods have occurred through all the ages, even though the virgin forests covered the face of the land. Forest protection is a vital issue and of great public concern and reforestation should be fostered and urged for the sake of the forests themselves, and advantage should be taken of such benefits as may accrue from them in the conservation of water resources.

"More complete investigations than have hitherto been made are greatly needed to establish the relationship between forest cover and rainfall and run-off, and altitude and rainfall. The federal government, in the Appalachian investigations, has undertaken the task of determining the relationship which forests bear to rainfall and stream flow through the eastern section of the United States. The results of these investigations will be awaited with interest by engineers and all persons concerned in the conservation of water and the forests.

"Through the creation and scientific operation of storage reservoirs, and through this means only, will the true conservation of water be accomplished. The floods which otherwise would run to waste or pass unused for power and industrial purposes or cause damage and loss, would be restrained and impounded, to be gradually released during those months of the year in which every cubic foot of water can be put to use for municipal water supplies, for the generation of power, the improvement of the sanitary condition of the streams, or the assistance of navi-

PORTAGE FALLS, GENESEE RIVER—NORMAL WINTER CONDITION.
The flow in summer is 100 cubic feet per second.



PIERCEFIELD DAM—RAQUETTE RIVER.
This condition is an annual occurrence, causing the mill to shut down.

COLTON FALLS—RAQUETTE RIVER.
An opportunity for a 32,000 H. P. development with a regulated flow of the river.

gation. Assuming, then, that the creation of storage reservoirs will furnish a practical solution of the water conservation problem, we may take up the question: By whom, or by what authority, shall these reservoirs be constructed, owned and operated; by whom shall the expense of such improvements be borne—and who, if any, of the beneficiaries, either individuals or corporations, private or municipal, should pay for the benefits received by them as a direct result of the creation of the reservoirs and the regulation of the streams upon which they are situated?

"The government of the United States, through the reclamation service, has taken up a part of this problem and is solving it with regard to the storage of water for irrigation of the larger arid territories, and for the prevention of floods; but so far, all the work accomplished relates to the public lands. It is obvious that none but the federal government should have authority to construct and control such storage and reclamation projects. It is equally obvious that streams which are situated wholly within one State should be under the jurisdiction of that State; but in the case of an interstate stream, or an interstate boundary stream along which there lies no public land, it is not so clear as to the authority which should have final control. There are many cases where one State suffers the consequences of floods from an adjoining State, while the latter, in which the stream has its source, is spared from such damage. It would then not be proper to put the one State to the expense of creating storage for the benefit of an adjoining one; nor could the suffering State properly undertake to build public works in a territory over which it has no jurisdiction. Under such circumstances the Federal government should have the power to control or arbitrate the situation, determining the benefits accruing to each of the States interested and exacting from them proper compensation for the relative benefit which each State receives.

"For the five years last past, the proposition of governmental control of water power streams has been agitating the public mind and in some quarters much strife has arisen over the matter. Out of it all has grown the necessity for a number of investigations by Federal or State authorities. Commissions have been created in at least five States to investigate water resource conditions and the conditions relating to floods and water supplies and water powers. In some of the States, two or more commissions have been created—each to consider a different branch of the subject. These commissions have been given power and authority to investigate all of the conditions relating to water resources, especially with regard to the conservation of water for the improvement or creation of water power. They have been directed to formulate plans, or a scheme, for the control of water rights owned either privately or by the nation or the State. Much valuable information and data have been accumulated and recorded in the reports of these commissions.

"In the investigations and the formulations of plans which have been proposed for the conservation of water, they are all confronted with a situation which is difficult to overcome. The constitutional right of an owner of land to keep and enjoy his own property is involved in many of the water storage projects, and this presents one of the greatest obstacles in the way of progress along the line of water conservation for any other than domestic water supplies. This question may be stated as follows: Has the State the right and power to take private lands, against the will of the owner, for stream flow regulations by the creation of storage reservoirs or other hydraulic works? Or, can the State delegate that power to an individual or a corporation holding or using water rights on any stream under its jurisdiction?

"The Federal and State constitutions provide that "No person shall be deprived of life, liberty or property, without due process of law, nor shall private property be taken for public use

HANNAWA FALLS DAM—RAQUETTE RIVER.
Water being wasted because of no storage provisions.

HUDSON RIVER AT GLENS FALLS.
International Paper Company's mill.

GENESEE FALLS, ROCHESTER.
Typical Spring Flood.

without just compensation." The due process of law by which title to lands is taken from an unwilling seller upon the payment of just compensation, is by the exercise of the right of eminent domain or condemnation, whereby lands may be acquired for a *public use,* and where the greatest good to the greatest number is the governing principle. Land cannot be taken for water storage or hydraulic works against the will of an owner, unless the use to which the water is to be put is declared to be a public purpose within the meaning of the Constitution. Until the storage of water for stream regulation is declared to be a public purpose, the public cannot exercise the right of eminent domain, without which right many a desirable water storage proposition would be rendered impossible of development.

"That water is an absolute necessity to the life and material progress of the commonwealth, and that its conservation would be a great public benefit is undeniable, but the storage of water for anything other than municipal water supplies for domestic use and for navigation under the control of the Government or State, has not been declared a public use; therefore, unless there is constitutional authority for acquiring private lands for the purpose of effecting storage, the owner of a small and insignificant parcel of land could successfully block the most desirable improvement, if he were unwilling to part with his holdings; or, one or more land owners could place so fictitious a value on land in the basin of a proposed reservoir as to make the price prohibitive and the project impracticable.

"Water required by a municipality for domestic uses is held to be a public purpose and consequently municipalities have been given authority to exercise the power to acquire lands by condemnation proceedings for the creation of reservoirs, the construction of dams, aqueducts and other works appurtenant to municipal water supplies. The State has the power to condemn lands for canals and navigation because of the public purpose to which they are to be devoted.

"Many owners of water power, and some of our legislators, are now advancing the argument that the same right of condemnation of land for storage reservoirs or for power developments should be granted to power companies, or owners of power rights, whether individual or corporate, and that the storage of water for flood control and the generation of power is a public purpose, especially when the power generated is to be converted into electricity and used for light, heat, manufacturing and transportation. This view seems reasonable and the argument has much merit in it, but the matter must receive careful consideration before it can become an established law.

"Many years ago, when transportation was difficult and the steam-power mill was unknown, grist-mills and saw-mills operated by water power were absolute necessities in the communities which grew up around them. Under these circumstances, the State of Massachusetts and several other New England States enacted laws giving the right of condemnation for the flowage of lands for mill ponds, presumably upon the ground that the people of such communities depended upon grist-mills and saw-mills for their homes and their living; that the use of water power for grinding flour and grain for family and cattle, and the sawing of timber for the construction of their homes, was a public purpose. Grave questions have been raised as to the constitutionality of these laws, known as "The Mill Act," but the courts have sustained the law on the ground of expediency.

"The States of Maine, New York, Pennsylvania, New Jersey and California have created State Commissions, known as Water Supply Commissions, or Conservation Commissions, as a permanent department of State government and have placed under their jurisdiction matters pertaining to domestic water supplies, water storage and water power developments. Other

States have this matter under consideration and in all probability many more will follow the example of those which have already created a water department.

"The development of the electric generator and the perfection of power transmission systems which have taken place in the last generation have made water power a valuable asset and have eliminated the necesity of locating the factory immediately at the site of the water power development. The energy of the waterfall, through the medium of electricity, may be delivered to the consumer at points far distant from the waterfall and be used for light, heat and power, which, under the economy of present-day life, have practically become public necessities in every thriving community.

"The energy of consolidated sunlight stored up in coal has heretofore supplied these necessities through the medium of steam, but as the coal supply is diminished and the price of coal rises and we realize the enormous waste of power which results from the use of coal—even with our most modern boilers and high efficiency engines—the value of its rival, water power, will become more apparent and men will seek the cheaper source of power which water furnishes. The coal deposits are limited and at the present rate of consumption the supply in this country will be exhausted in from seventy-five to one hundred years—so we are told by those who have devoted study to the subject. Water, the inexhaustible resource, has been, is now, and probably always will be, a dependable source of power, provided it is wisely conserved and economically used.

"The people of the land have been prodigal in the past use of their bountiful supply of natural resources. We have wasted much of our inheritance and if this waste is to stop and our resources are to be husbanded and conserved, the time to begin is now. Let the conservation of water be a live issue with us—and not merely a pleasant-sounding theory upon which magazine and newspaper writers may thrive. It is a large subject, of nation-wide importance, in which the engineer has a conspicuous part to bear. He must measure up to his part or be left behind, for the movement is going forward and water conservation is going to be accomplished.

[Illustrations by courtesy of the Yale University Press.]

CALIFORNIA POWER DEVELOPMENT

A WATER-POWER permit has just been granted by the Secretary of Agriculture to the Truckee River General Electric Company, a California corporation, under which this company will develop power on the Eldorado national forest, to serve various California towns and cities.

In developing power the company states that it expects to construct seven reservoirs, five for water storage and two for equalizing the flow. Two of the storage reservoirs are on the upper Rubicon river. By the use of a tunnel, approximately a mile and a half long, the flow of the upper Rubicon river and the waters stored in these two reservoirs will be brought into the Gerle creek drainage where the waters will be further stored. From this storage the water will be conveyed by ditches and natural streambeds to Pilot creek, upon which the two power plants mentioned in the permit are to be located. The water will finally be discharged into the Rubicon river.

At each of the two plants there will be a head of approximately 1,300 feet. The company expects to make an initial installation which will develop about 16,000 horse-power, which will probably be doubled as the market for the product increases.

WASTE IN CUTTING TIMBER

By R. C. Bryant

Professor of Lumbering at Yale College

ONE branch of logging work which has not received sufficient attention has been the felling of the timber and the cutting of the boles into logs. Some of the reasons why the industry is backward in this respect are a lack of appreciation of, and on some operations an apparent indifference to, the actual loss sustained; inefficient labor working under improper supervision; log rules and log scaling methods which indirectly penalize the sawyers when certain types of boles are cut advantageously for the logger; and low values for the manufactured product which tend to discourage the most efficient utilization. Some of the more progressive lumbermen have given serious thought to the improvement of their timber cutting and log-making but the majority of them have failed to take effective steps to revise their methods.

The logger of thirty years ago was excusable, to a certain extent, for the methods he employed, since stumpage was cheap and the only merchantable logs were those which would produce the better grades. High stumps were cut and long tops and defective and broken timber were left in the forest. It was of little importance to the operator if his logs were cut several inches too long, since his actual monetary loss in stumpage was small. With the strong demand for low grade lumber today, the standards on which a "merchantable" log are based have radically changed and, in most sections, nearly all of the bole can be utilized at a profit, provided it is properly cut into logs.

The writer has been impressed by the apparent neglect of this phase of logging work in all parts of the country. Some maintain that it is folly to attempt to utilize the timber closely, especially crooked trees and top logs, because it reduces the daily output of the mill, increases the per cent of low grade lumber and lowers the average price per thousand board feet received for lumber at the mill. It also postpones the time when the initial investment in stumpage and manufacturing facilities can be recovered. Others argue that however desirable careful methods of cutting may be, they are unable to apply them because of their inability to secure capable foremen and workmen.

It is true that the sawing of rough logs reduces the daily cut of the mill because of the slower speed at which such logs must be cut. The loss in output is partly offset, however, by the value of the raw material used which otherwise would be an absolute waste. Every additional thousand feet of timber secured from a given acre lengthens the life of the operation, reduces depreciation and similar charges per thousand feet, and in the end means increased profits. Some large southern operators doubt the possibility of securing a marked future advance in the price of their product, pointing to the fact that when white pine reached a high average mill price, other woods were substituted for it and the price held down. They foresee a similar fate for southern yellow pine. The future conditions for this species are scarcely comparable to those of white pine, since the supply of available substitute woods which can be sold at a lower price are now extremely limited, and then there will not be the vast quantities of yellow pine, hemlock and like species which have influenced the price of white pine. There is every reason to believe that during the next decade yellow pine will at least reach and possibly exceed an average mill value of $25 per thousand board feet, which some operators have set as the maximum price it will bring. It is fair to assume that the history of lumber values in Europe will be repeated in this country as time goes on and the supply of stumpage decreases

and that the operator who can postpone the conclusion of his operation for even a decade will make a greater profit on his investment than he could by rapidly converting his stumpage into money and reinvesting the proceeds in other business ventures.

Factors other than the fear of increased future competition have also tended to encourage the rapid conversion of stumpage. Many of the larger operators have heavy investments in plant and timber. The conduct of the business entails a heavy overhead charge which must be met periodically and where the owners are heavy borrowers of capital the tendency is to cut that timber which will yield the highest immediate returns. The business is also subject to certain charges, such as taxes, both on net income and on stumpage and plant, and the methods of assessing these may be radically changed in the future. A potent factor in encouraging rapid cutting of timber is the possibility of such a marked advance in the tax rate, especially in communities which are not friendly to large corporations, that the rise in value of stumpage and lumber might be counterbalanced by the higher tax. A further source of unrest is the increasing tendency of the Federal and State Governments to regulate corporations engaged in exploiting natural resources. While no radical measures have yet been put in force looking to the public supervision of our forest resources there is a possibility that some form of forest management may be demanded of timberland owners. It is doubtful if any far-reaching measures will be enacted in the near future, but the uncertainty of public action is tending to hasten cutting, especially where the operators have little interest in the conservation movement.

FIG. NO. 1—A SHORTLEAF PINE TWELVE INCHES IN DIAMETER AT THE STUMP, THE CROWN OF WHICH WAS BROKEN BY A LARGE TREE THROWN AGAINST IT, THROUGH CARELESS WORK OF THE FELLING CREW. THE STUB SHOWN WOULD MAKE A MERCHANTABLE LOG, 11 INCHES IN DIAMETER AND 16 FEET LONG. SCALE, BY DOYLE RULE, 49 BOARD FEET. ABOUT 90 BOARD FEET OF LUMBER COULD HAVE BEEN MANUFACTURED FROM THIS LOG.

The desire for quick returns is seen in the great increase in mill capacity throughout the country. Today, the possible output exceeds the demand, and prices of lumber have suffered in consequence. Nevertheless, the plant, once built, should be operated since idle machinery represents an investment on which returns cannot be secured.

The argument that an inadequate

FIG. NO. 2—A SOUND BOLE BROKEN BY FALLING ON THE STUMP SHOWN ON THE RIGHT. THE LOSS, LOG SCALE, OF MERCHANTABLE MATERIAL IN THE BROKEN SECTION WAS 64 BOARD FEET. THE VALUE OF THE SPLIT LOG WAS ALSO REDUCED. WASTE OF THIS CHARACTER IS NOT INFREQUENT EVEN ON OPERATIONS WHERE OTHER BRANCHES OF WORK, EXCEPT TIMBER CUTTING, ARE CONDUCTED IN AN EFFICIENT MANNER.

number of competent laborers precludes close utilization is, in most cases, based on theory and not on fact, since very few of those who support it have made a serious attempt to solve the labor problems concerned with the elimination of waste of merchantable timber. It is true that the number of men capable of supervising close utilization is not large, chiefly due to the fact that no special effort has been made to train men for this work. There are, however, many men with potential ability along this line who only await the opportunity to undertake work of this character. The lumber industry of the United States has developed machinery for use in the forest and manufacturing plant which is far superior to that in any other country and the application of the same energy and resourcefulness to the subject of closer utilization would soon solve the problem.

The log rules used in some sections work a hardship upon the log cutter who is paid for his work by the thousand board feet of timber cut. This is especially true of top logs when a rule such as the Doyle is used. It often happens that by leaving two feet of merchantable material in the top, the log makers secure more scale from the tree than they do when they cut the full merchantable length. The reason for this is that the taper on the upper part of the bole, especially near the extremity, is greater than on the lower part and a shifting of the point of measurement two feet nearer the top makes a sufficient difference in diameter to throw the log in the next smaller inch class, with a resulting loss in a log scale.

FIG. NO. 3—A TREE BROKEN BY FALLING ON A STUMP. NOTE THE ABSENCE OF ANY OBSTRUCTION FOR MANY FEET ON EITHER SIDE OF THE STUMP. THE BROKEN SECTION WHICH WAS CUT FROM THE LOG SCALED 54 BOARD FEET, AND APPROXIMATELY 72 BOARD FEET OF LUMBER COULD HAVE BEEN MANUFACTURED FROM IT.

On large logs the two-foot increase in length would more than counterbalance the loss in diameter, but on small logs the rule gives low values and the added length is not sufficient to overcome the decrease in diameter. Thus, for instance, if the merchantable length is sufficient for a twenty-foot log, eleven inches in diameter, the scale by the Doyle rule would be 60 board feet. If the log makers waste two feet and cut an eighteen-foot log, twelve inches in diameter, the scale would be 72 feet. The first log will actually saw out at the mill about 140 board feet and the other log only about 125 board feet, although it has a greater content by the log rule. The writer has seen numerous cases where the operator has sustained a loss of this character. The average laborer, working on a contract basis, usually places his own interests above those of his employer and there always will be difficulty in having log-making done satisfactorily, where a rule like the Doyle is used, unless its discrepancies are adjusted or remuneration is made on some basis other than contract.

Some of the chief defects of the present felling and log-making methods in the South are the following: The breakage of small standing timber and its abandonment; waste in high stumps; breakage of boles on stumps and other obstacles; improper division of crooked and forked boles; waste in log lengths; waste in the tops; disregard of quality, and waste in windfall timber.

Many operators have set a diameter cutting limit of from twelve to fourteen inches at the stump, which is based on the lumberman's idea of the smallest tree he regards profitable to manufacture. This diameter limit is usually

FIG. NO. 4—AN EXAMPLE OF THE DISPLAY OF POOR JUDGMENT ON THE PART OF LOG MAKERS IN CUTTING A CROOKED-BOLED TREE. THE LAST CUT SHOULD HAVE BEEN MADE AT THE KNOT LOCATED AT THE CROOK. THAT PORTION ABOVE THE CROOK SHOULD HAVE BEEN ABANDONED AND THE PART BELOW COMBINED WITH THE LOGS CUT FROM THE LOWER PART OF THE TREE. IN ITS PRESENT CONDITION THE LOG IS PRACTICALLY WORTHLESS. SUCH CARELESS WORK IS NOT INFREQUENTLY SEEN ON MANY OPERATIONS.

arbitrary and has rarely been chosen after a comprehensive study of costs of production and sale value.

Many southern pine forests are composed of uneven aged stands in which there often are many poles which fall slightly below the diameter limit and hence are left. Since most operators are not interested in a second cut, no regard is paid to having this young timber and the faller is not averse to dropping a large tree on one of them, provided there is no danger of its being hung up. An instance of the damage resulting from such careless methods is shown in Fig. 1. The stub would have made a sixteen-foot log eleven inches in diameter at the top end and would have scaled 49 board feet by the Doyle log rule. The actual yield of lumber at the mill would have been about 90 board feet. Assuming a stumpage value of $5 per thousand board feet, Doyle rule, the loss to the operator was 25 cents, exclusive of the profit he would have made on the sale of the lumber.

The cutting of high stumps is not as prevalent as formerly, but many still cut them from twenty to twenty-eight inches high on medium-sized trees and sometimes higher for the largest ones. This is due not only to a lack of appreciation of the loss of timber that results, but also to the belief that sawyers would rebel on being forced to cut lower stumps. There is always some opposition on the part of workmen to any innovations that are forced upon

FIG. NO. 5—A COMMON METHOD OF CUTTING FORKED BOLES. ONE CUT WOULD HAVE SUFFICED HAD IT BEEN MADE JUST TO THE RIGHT OF THE FOOT-RULE SHOWN IN THE ILLUSTRATION. THE TIMBER IN THE CROTCH WAS SOUND AND THE MAIN STEM SHOULD HAVE BEEN INCLUDED IN THE LOG JUST BELOW IT AND THE TWO PRONGS SHOULD HAVE BEEN INCLUDED IN THE LOGS CUT ABOVE THE CROTCH. THE WASTE, LOG SCALE, IN THIS CROTCH IS 73 BOARD FEET. APPROXIMATELY 100 BOARD FEET OF GOOD LUMBER COULD HAVE BEEN MANUFACTURED FROM THE ABANDONED PORTION.

them, especially where the labor is more arduous and the compensation remains the same. That low stumps are practical and that labor can be secured to perform the work with satisfaction, has been demonstrated on the National Forests where, for years, low stumps have been the rule. There is little reason why sound stumps of southern yellow pine of average size should be cut more than eighteen inches high and the majority of them not over sixteen inches high. It is far better policy to save the timber in the stump, and if necessary, leave an equal length in the top, since by so doing timber of larger size and better quality is secured.

A very serious fault on many operations is the breakage of timber in felling, examples of which are shown in Fig. 2 and Fig. 3. The timber in both of these cases was perfectly sound and was shattered by falling on stumps. It is very rarely the case that a loss of this character can be justified on any ground other than gross carelessness. The loss in stumpage at $5 per thousand board feet in the tree shown in Fig. 2 is 32 cents, and in Fig. 3, 27 cents. In addition, the upper log in Fig. 2 was seriously damaged by a heavy slab which was split from it. The examples shown in these figures are only two of many observed on the same operation.

The actual loss in cutting logs from broken timber is often greater than is necessary, since the cut is usually made so that the entire broken section is removed. It frequently happens that the break is not square across the bole, and a slab is torn from one side of it. When this is the case it should be the policy to make the first cut on large

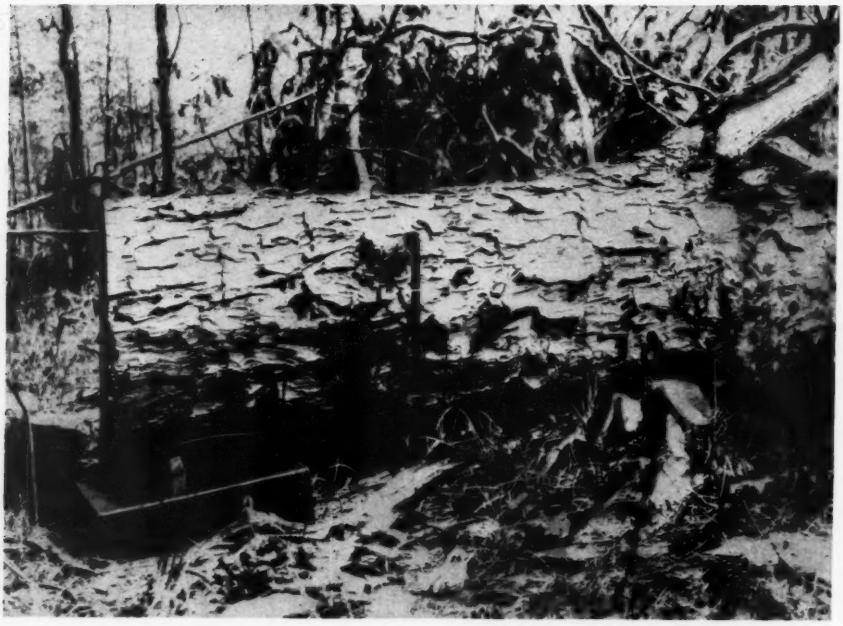


FIG. NO. 6—A SOUND LOBLOLLY PINE TIP FROM WHICH A FOUR-FOOT SECTION, 18 INCHES IN DIAMETER, COULD HAVE BEEN SECURED. THE ONLY DEFECT WAS A LARGE LIMB ON THE BACK SIDE OF THE LOG. IF PROPERLY CUT IN THE MILL, NEARLY TWO-THIRDS OF THE LUMBER THAT COULD BE MANUFACTURED FROM THIS SECTION WOULD BE CLEAR. THE LOSS, IN LOG SCALE, DOYLE RULE, WAS 49 BOARD FEET. APPROXIMATELY 60 BOARD FEET OF LUMBER COULD HAVE BEEN MANUFACTURED FROM IT.

timber at a point on the bole where the diameter of the broken section is not greater than one-half that of the original. In this way it is possible to secure boards of greater length from one-half of the log.

Log-makers in the South frequently neglect to employ the correct method of making crooked and forked boles into logs, a fact well illustrated in Fig. 4 and Fig. 5. The cut on the bole shown in Fig. 4 should have been made at the knot shown at the curve, and that portion in the foreground left in the log below. The section above the crook is too short to make a merchantable log, and under present methods of manufacture it would have been advisable to have abandoned it. In Fig. 5 the cut should have been made just to the right of the foot-rule shown in the picture. This would have left the right-hand section on the lower log and the left-hand sections on the logs above them. The needless waste as the tree was cut was 75 board feet. This may be accounted for by the fact that workmen seldom have their employer's interests at heart; they have little knowledge of the loss in manufacture occasioned by crooks and forks in logs; and further, an effort has seldom been made by operators to teach the men better methods. The loss to the operator does not stop with the waste in stumpage, for he pays for work improperly done in the forest and also incurs additional expense in manufacturing the timber at the mill. The added cost of handling crooked and forked logs is frequently 50 per cent greater than for those of the same diameter which are straight and the amount of lumber that

can be secured is from 20 to 75 per cent less.

Studies made in southern mills, by the author, show that the cut of a single band mill may easily be reduced from twenty-five to fifty logs, daily, when many crooked or forked logs are brought into it. This means a daily reduction in output of from 3,000 to 6,000 board feet. It can be readily seen that the cost of handling such logs is great, and since the conditions can be easily remedied, an opportunity is afforded many operators to increase their profits by paying closer attention to the cutting of such timber in the woods.

Carelessness in log-making is often shown in marking off log lengths on the bole of the felled tree. Custom has established the rule that lumber shall be made in even foot lengths, in multiples of two feet; hence the logs in the forest are cut in a corresponding way. It is necessary, however, to cut the logs a few inches longer than the even foot to allow for damaged ends and for trimming at the mill. This practice is especially necessary where logs are transported by water, since the ends may become battered or bruised by contact with rocks and other obstructions, and also may become discolored if left in the water for a long time.

A trimming length of from three to four inches is regarded as ample by loggers, even for long logs, the lumber from which is to be cut into shorter lengths. It has been found on investigation that there is a wide discrepancy in the trimming length on logs cut on many operations, the lengths being either too short or too long.

An examination and measurement of 1,000 logs on the skidways of a southern operator disclosed the fact that 24 per cent of the logs were cut too short and 33 1-3 per cent were cut too long. The loss in the short logs was more serious than in those which were cut too long, because in most instances the lumber manufactured from them would be reduced two feet in length at the trimmer in the mill. The second case, where the logs were cut too long, is the lesser evil of the two, since the lumber may be sawed the full length of the log, the loss being a few inches of trimming length only. There is, however, another form of loss which is involved in allowing a greater trimming length than is required. If every log cut from a bole is six inches longer than necessary, the loss on a four-log tree would be two linear feet which might have been added to the top log. The observed loss from the careless marking of the log lengths has in some cases approximated 1 per cent of the total cut of the operation. This evil is capable of ready correction, since it is due, chiefly, to improper supervision of the saw crews. Careful inspection of the work of log-making crews and frequent checking of the lengths of measuring sticks used by them is a certain remedy for this form of carelessness.

Waste in the tops of timber may be seen on nearly every operation. It may either be the result of leaving a merchantable section two or more feet long on the top, as shown in Fig. 6, or it may result from a lack of judgment on the part of the log-makers in selecting the cutting point on timber which has one or more large limbs on one side of the bole only. The neglect to take the full merchantable content of the bole is sheer carelessness on the part of the log-maker, since elementary judgment, only, is required to ascertain the proper point for making the final cut. The second case is somewhat different, since the question of whether a knotty top is merchantable involves judgment and a general knowledge of the purpose for which the lumber cut from such logs can be used and also the manner in which it is to be sawed in the mill. There are frequent cases where the bole is twelve or more inches in diameter at the base of the main crown, and has one or more branches on one side only, which are located lower down. A common practice among log-makers is to make the last cut below the limbs, disregarding the clear material which is present on one-half of the bole. The top log can often be cut two or more feet longer than is now the practice,

FIG. NO. 7—A MERCHANTABLE WINDFALL ON CUT-OVER LAND. THIS TREE WAS WITHIN 300 FEET OF A PUBLIC HIGHWAY AND WITHIN ONE-FOURTH MILE OF THE LOGGING CAMP. THREE LOGS, CONTAINING 100 BOARD FEET, DOYLE RULE, COULD HAVE BEEN CUT FROM THIS TREE. THE LOGS WOULD HAVE YIELDED 200 BOARD FEET OF LUMBER. TREES OF THIS CHARACTER, WHICH ARE NOT WINDFIRM, SHOULD BE CUT WHEN THE AREA IS BEING LOGGED.

and this timber saved. The gain is very appreciable in logs having medium or large-sized tops. If that portion of the section containing the knots is too coarse for use as lumber, the ends of the boards on one half of the log can be trimmed in the mill. The added length on the remaining half of the boards will in no way reduce the value of the product and will give the operator a greater amount of lumber at practically no additional cost.

Actual measurement of certain logged lands on conservative operations in the South have shown a waste in tops alone of from 2.5 to 3.5 per cent of the total cut. It is believed that on many logging jobs the per cent is even greater.

A factor in log-making which has not received much attention from loggers is the division of the bole for quality as well as quantity. With a seeming disregard of values, the cutting points on the bole are often made so that the clear portions are included in the same log with rough, knotty portions. The value of a board is determined by its poorest part, and the high-grade lumber which could be produced from the clear part of the bole is greatly reduced in value by the inferior portion. Careful attention to the division of the bole into logs will enable log-makers to keep the clear portions of the bole in given logs and the rough parts in separate ones. By this means a given tree may be made to yield a higher per cent of the better grades, with a corresponding increase in the value of the product. This will involve very little, if any, additional expense in cutting timber.

Under the present system of cutting to an arbitrary diameter limit small

timber often remains which is not wind firm. This usually blows down during the first wind storm that occurs during a wet period and the timber is lost, since it seldom is profitable to return to the old cuttings to secure small blown-down timber. The loss of trees from this source could be eliminated by removing them at the time the large timber is cut. An illustration of waste of this character is shown in Fig. 7. Three merchantable logs could have been cut from this tree, which would have scaled 100 board feet, Doyle rule.

The importance of close utilization in the forest, not only from the standpoint of the owner's interest but also from the duty timberland owners owe to the community at large, demands greater attention than it has received or is now receiving. Although lumbermen may feel that the practice of forestry is still impractical on their holdings, they have an opportunity to undertake one of the first steps in conservative lumbering by utilizing every foot of merchantable timber in the trees that are now being cut.

There are numerous phases of the utilization of merchantable timber which can not be solved by individuals working alone. For this reason, and also because the subject is of widespread interest to the country at large, a fruitful field of effort is open both to loggers and lumber manufacturers' associations, not only in educating their members to the desirability of more careful cutting methods but also in encouraging investigation along other lines of utilization and themselves conducting research work which will be of value to their members and the industry at large. An opportunity is afforded at meetings to discuss the experience of members who have carried on investigative work of this character. The knowledge acquired at such meetings, combined with the results secured from other sources, would furnish a basis for bringing timber-cutting to a high degree of efficiency.

While the problem of utilizing timber that is now non-merchantable will require the improvement of present or the development of new processes for converting the raw product into a marketable form, there are no special difficulties underlying the solution of the careful utilization of timber that, although of merchantable character, is still wasted, due to inefficient work on the part of woods workers.

The problem will be practically solved when the operators install a thorough system of inspection of felling and log-making work. This may appear an insurmountable task to some, largely because they have never tried it. Although efficient men for supervisory work are not numerous, they can be secured by training wide-awake, enterprising young men who are now engaged in logging work. It will not be sufficient for the operator to briefly outline the results desired, since there will be need for a readjustment of labor problems and possibly certain other phases of the logging work which can only be brought about successfully by the closest co-operation of employer and employee.

A man to be a successful inspector or saw boss should not alone be one who is capable of teaching and handling men, but should also be a scaler competent to judge of the quality of lumber every log will yield. In order to be able to perform the latter duty it is essential that he not alone be able to measure logs, but also likewise must know how the timber is to be handled in the manufacturing plant, and must possess a knowledge of timber and lumber values. It is essential, therefore, that he be taken into the confidence of his employer and posted on methods of manufacture, the character of the finished product into which given logs can be manufactured to best advantage, and the sale value of the same. If he possesses the qualifications mentioned, which many men are capable of possessing and do possess, the operator will find him one of his most valued assistants, judged from the results secured.

WATER LAWS, STATE AND NATIONAL

A REMEDY FOR THEIR CONFLICT

By Charles N. Chadwick, *Commissioner, Board of Water Supply, City of New York*

THE present laws of the United States regarding water are an inheritance. The West has been controlled by the civil law of Rome through the Spanish law and the early Mexican grants. In the East the Dutch law and the English law underlie state legislation. The common law of England in regard to water was originated and developed in a country of moist climate and abundant rainfall. It was transferred to and applied by the original English colonies under similar climatic conditions and became the common law here, with its riparian rights and vested interests, as particularly expressed through the statutes of New York State in the classification of water as "real estate."

The problem of water conservation has to do, in the last analysis, with the use of the normal rainfall and the rules and regulations governing it.

Water is used in three ways: (1) Engineers employ the generic word "potable" to include all operations of running water in the city; (2) it is needed to grow crops, either from rainfall or by irrigation; (3) it is required by commerce, to float merchandise and farm products in canals and streams, to turn power wheels and to generate electricity. For these three uses water is conserved and developed both by natural and artificial means.

The natural means of development are forests (which control the seepage of the rainfall), streams and natural lakes. These are in general sufficient for the agricultural community. Municipalities and other congested population districts and arid agricultural communities are dependent upon artificial means. The State should protect all these interests by wise laws regarding forestry irrigation, drainage, the construction of storage reservoirs and aqueducts, the maintenance and regulation of stream flow, of power development and of the commercial use of water and waterways. This it now does inadequately.

To understand the use and control of rainfall it is necessary to take into consideration the campaign of education which is going on in the United States as the result of varying conditions prevailing in the different States; These conditions being the result of a diminishing momentum of the application of the principles of the common law as expressed in statutes, judicial interpretation and local application of riparian rights, and of an increasing momentum of the application of the civil law as expressed through prescription,—adverse use; the right of prior appropriation of water rights, and of late the insistence of power development.

The particular factors which control the entire body of water laws, and which have induced a narrow local policy, are the large and abundant rainfall of the Eastern States and the small rainfall of the arid and semi-arid States of the West. To determine the end to be accomplished and to provide means for its accomplishment requires a National policy, which shall consider the welfare of the people as a whole rather than any special profit to individuals or corporations, and which shall comprehend the development of agriculture, the control of potable waters for the health and comfort of homes and communities, and the industrial use of water.

The meteorological, geological and geographical conditions of the different States should explain and regulate this policy. Legislation should be enacted free from political influence and private or corporate bias. Such legisla-

tion can be attained only by the Nation, the State and the individual working in harmony to produce co-ordinated statutes.

The danger lies in placing emphasis upon the detail. When the people shall enter upon the determination of this question and express their will through act of legislature, they will do well to clearly understand what their rights and privileges are. Before the States make their selection of streams for irrigation and power development, the question of vested rights in water must be determined. If this be not done it may later appear that in the development of such streams in the humid States the vested rights of the riparian owners or legislative absorption of these rights by quasi-public service corporations; and, in the arid States the confiscation of such rights by prescription or appropriation, may be so successfully set up and maintained that the people will find they have parted with their rights, taxed themselves, and authorized their representatives to expend the money thus obtained for the conversion of a great natural resource into a private monopoly,—to their own loss and exclusion.

A NATIONAL POLICY

Until these questions are understood, and the final jurisdiction of water rights on a stream determined, the exact relation of the Nation to the State and of the State to the riparian owner or to the user by prescription or by appropriation cannot be rightly adjusted. Therefore, there should be a broad, constructive national statute, supplemented by State legislation, which should co-ordinate all the elements of this water problem, with due regard to national, State, corporate and private interest. This means that we should take our water policy from its forty-eight masters and make it a national policy,—not a New England policy or a Middle States policy, not a Far West or Pacific Coast policy, not a Louisiana or Texas policy,—but a national policy.

Generally speaking, there are two classes of conditions which are controlled by rainfall: In the East, with an abundant rainfall, the agricultural interests are not prominent and mill rights are of even less importance, but the necessity for protection of watersheds against pollution, and against the invasion of vested rights making the taking of land for potable use almost prohibitive, is paramount. In the arid and semi-arid States of the West the limited rainfall brings into prominence the agricultural interests, and the emphasis there rests upon water for irrigation purposes. In both cases the commercial use of water should be secondary. In the arid States, where water is appropriated by individuals or by corporations for irrigation purposes, whether for use or profit, the water so taken should be applied to beneficial use without unnecessary waste. To that extent it should be appurtenant to the land or the locality to which it is appropriated. The general principle of the United States Government regarding the disposition of public lands—that is, for use rather than exploitation—should be the determining factor.

It is claimed that in the administration of water rights for irrigation the real purpose should be to encourage the settlement of land, the development of agriculture and the building of homes and communities; that these will be promoted if water rights are made appurtenant to the land on which the water is used; that the appropriation of water for exploitation purposes should be a temporary right to be exercised only until the real owners of the land shall assume complete control. In other words, ownership should vest in the owners of the land and not in a corporation interested in the sale of water.

This principle of appropriation for private purposes finds expression in the East in the attempt of quasi-public service corporations to secure paramount right of eminent domain, as against all interests except the State itself, and even that they would subordinate if they could. Human nature is very much the same whether it works through the terminology of eastern law or western statute. The far-sighted, astute corporation, recognizing the

priceless value of water rights, whether for irrigation or for electrical energy, seeks to substitute private interest for the common good, to secure corporate control as agent of the few in place of State or national control as agent of all the people. Whether known as appropriator of water for sale, or as quasi-public service corporation for power development, their right is only the right of agency; they belong in the category of regulated monopolies, subject to the control of the State. The transfer of the control of the State and of the Nation over its waters to these interests should be obtained only by the consent of the people themselves. To part with the right of eminent domain in this matter would be a careless gift of a priceless possession, for the control and utilization of the rainfall is the Nation's greatest asset.

Therefore, the statutes governing waters and water rights, as expressed through federal and State laws, should be dealt with in their entirety. They vary in the different States, being the result of legal precedent and the evolution of interest controlled by climatic conditions and industrial requirements. The controversial rights and legal technicalities incident to legislation dealing only with the details of water development under local conditions should be avoided in comprehensive legislation.

Under the influence of these two great systems—the Common law and the Civil law—there has developed an antagonism in theory and practice. The common law recognizes riparian rights, and the civil law recognizes prescription or adverse use, and prior appropriation for beneficial use.

The common law doctrine declares riparian rights are such as follow or are connected with the ownership of the banks of streams or rivers.

"Every proprietor of land on the bank of a river has an equal right to the use of the water which flows in the stream adjacent to his land as it was wont to flow, without diminution, pollution or alteration. No proprietor along the bank of a stream, however, has the right to use the water to the prejudice of other proprietors above or below him. These rights are inseparably annexed to the soil and pass with it, not as an easement or appurtenance, but as a part and parcel of the land. This property can be regarded only as a corporeal hereditament belonging and incident to the soil the same as though it were stones or grass."

The doctrine of appropriation for beneficial use is based on the maxim:

"He who is prior in time is prior in right."

"Water is treated as a 'wild animal' which becomes the property of him who captures it first. It can only be retained by him so long as he puts it to beneficial use. If the supply is not sufficient for all, the ditch of the last appropriator must be closed to protect the prior appropriator."

These two systems are in direct conflict, and cannot both be applied on the same streams, for water cannot flow to the ocean and be diverted for beneficial use at the same time.

The doctrine of prescription is:

"The taking of water by adverse use. What none dispute is held by him who takes."

In some of the Western States definite information as to water rights and titles has to be sought for in decisions of the court, as well as in the statutes themselves, and there are often found in conflict as to fundamental questions. This is easy to understand when the conditions under which the statutes are enacted or the decisions made are considered. In many cases the laws are the result of the influence of the promoter or corporate interests advised by the lawyer and consented to by the legislator, with absolute neglect of the *technical knowledge and experience of the engineer.*

The theory of the English law, with the ownership of water "to the middle thread of the stream" differs from the Dutch law, where the ownership is only "to the bank of the stream," while under the old Roman law the "*extreme* high-water mark" was the dividing line, which in process of time came down to *ordinary* high-water mark.

The doctrine of riparian rights is recognized by the Pacific Coast States, except under certain limitations. The moist winds from the Pacific Ocean,

which come in contact with the snow-capped mountains of the Coast Ranges, the Sierras and the Rockies, drop in temperature and lose their moisture, and, passing over to the eastern slope, become dry and rainless. The result is that this sterile land gets its moisture only from the melted snow which forms into streams and rivers. This condition has evolved regulations based upon a different principle: the substitution of the right of prescription,—adverse use, and the law of appropriation—for that of riparian rights.

The Colorado Constitution of 1876 provided that all unappropriated water was the property of the public and that the right to divert it to beneficial use should never be denied. This declaration established the law of appropriation in Colorado, so far as the right to divert the water from the streams for irrigation purposes was concerned, and placed the right beyond the power of riparian owners to question.

The State of Wyoming is located on the Rocky Mountain divide. Its streams flow into adjacent States. It can withhold its waters to the detriment of prior appropriators in adjoining States, and, for this reason, has a natural advantage over those States. As within the State the upper appropriator can take more than his rightful share to the injury of the user of water below him, so the upper State can take more than its rightful share of interstate water to the injury of the lower State, and with no redress for the latter. The Constitution of Wyoming provides that, water being essential to industrial prosperity, its control must be in the State. Colorado, Wyoming, Idaho and North Dakota have by constitutional enactment abolished the doctrine of riparian rights. In California the doctrine of modified riparian rights has received the sanction of the courts. This is the right to take water:

"By appropriation from a stream on which there are no private riparian lands at the time of the appropriation. When once a piece of riparian land has passed into private ownership, thereafter no right to divert water above such riparian land for use on non-riparian land can be acquired, except upon the acquiescence or neglect of the riparian owner, that is, by right of prescription. No right to divert water below riparian land can be secure against the possibility of complete depletion of the stream by upper riparian proprietors."

This is somewhat complicated by the existence of water rights in connection with the old Spanish land grants. It has produced a situation involving confusion, litigation and great expense.

The growth of small farms to which riparian right attaches through a single continuous ownership raises a serious question. The riparian owner may prevent by injunction the diversion of water to non-riparian lands. This means severance of large areas of lands from any water right at all, and the acquisition of water rights through riparian ownership on those lands border immediately on the streams.

Throughout the States of Washington, Nebraska, Kansas, the Dakotas, Oklahoma and Montana the California doctrine of modified riparian rights has obtained; so that some users claim by appropriation, others by prescription and others by virtue of riparian rights, and the real user of water, of necessity, becomes the employer of the lawyer, to the great comfort of the latter.

No title to the water or the soil covered by it was conferred by the constitution to the federal Government, and the title to them remains in the several States. This raises the question of interstate waters, and of private and public interests. These interests, under modern industrial and municipal conditions, are becoming complicated. Therefore, the laws governing riparian rights, prior appropriation, independent waterways, private streams, title to land under water, ownership of surface water and subterranean waters, reservation of water for potable purposes and municipal use, for agricultural, commercial and industrial development and for recreation purposes and landscape effect, are matters for co-ordinated federal and State legislation.

Beneficial use is the great underlying principle of the law of appropriation. It is subdivided into priority, purpose, period, place, and quantity.

There must be a date; there must be a determination whether for domestic use, mining, power or irrigation; there must be a period of use; there must be a place appurtenant to use; there must be a quantity determined upon to avoid waste and benefit all.

This carries the right of appropriation to the extreme, and the last word has been spoken in Oregon, where the question of riparian use is a dead issue. Oregon was admitted as a State in 1859. At that time its water laws were in harmony with the customs of the miners, who staked their claims for water needed. It inherited the civil law but started with the common law, and the early decisions of the court were in harmony with those of the Eastern States. Riparian rights, connected with the ownership of the banks of streams or rivers wherein the proprietor has a right to the use of the water which flows in the stream adjacent to his land, came in conflict with the rule of appropriation for beneficial use where the appropriator prior in time has the prior right as long as he puts it to beneficial use. These two systems were in direct conflict, so that, in 1899, the State of Oregon declared by law all water to be the property of the public, with a board of control acting as an administrative body. Certificates for use of water are given upon application. The determination of the board of control is subject to appeal and final adjudication by the courts. It is claimed that—

"The Oregon system of water titles is of value because it is complete. Full power for determining old rights, for granting new rights, and for the protection of all rights, is concentrated in one board. The records are uniform, in simple tables by stream systems, assembled in one simple office where they are thoroughly indexed and digested for quick reference. Every step is taken in harmony with a preconceived plan and for the purpose of bringing order out of chaos."

States dependent upon irrigation claim that the law of riparian rights does not solve their problem.

On August 18, 1894, Congress passed what is known as the "Carey Act." This act inaugurated the plan of turning over lands to the States for irrigation, making a donation of one million acres of desert land to each of the States in the arid region, provided they shall cause the same to be irrigated and reclaimed. In issuing patent for the land taken under this act, the water rights are to be appurtenant to the lands patented, and beneficial use is to be the basis, the measure and the limit of the right. In dealing with water rights the act is not to be construed as interfering with the laws of any State or Territory relative to water used in irrigation, or with the vested rights acquired thereunder, nor as affecting in any way any right of Federal government or of any State, or of any land owner, appropriator or user of water in, to or from any interstate stream or the waters thereof. The importance of this act is scarcely yet understood, except where it is directly applicable.

In the early stages of irrigation the diversion of small streams had no appreciable effect on large interstate streams, and the interest of the public was in the streams within the State, not those between the States. It is only within recent years that a realization of the importance of an interstate stream as such has impressed itself upon the public mind. Litigation between States over a proper diversion of interstate streams has already been carried to the Supreme Court of the United States. State civil bounds now control interstate waters. This is illogical and is a frequent cause for discrimination, injustice and consequent litigation. The boundaries of an interstate stream of flowing water should be natural, not civil. From its source to its mouth there should be one jurisdiction and one system of water law, not State but Federal.

The principle of the beneficial use of water has to a certain extent been worked out in many of the Eastern States through mill rights. And here, as in the early history of the West, where the water power for the grist

mill used but a small part of the flow of a stream, there was little general public interest in the development of that particular power. But as the West, of necessity, has constantly changed its water laws, so now the Eastern States, under the pressure of economic interest, are considering new legislation.

The issue in the past between the humid and the arid States was clearly drawn; irrigation being the controlling factor in the one case and the doctrine of riparian right in that of the other. The water laws were becoming more and more dissimilar. Now that hydro-electric development is growing so rapidly, some of the Eastern States, under corporate influence, are considering laws similar in character but different in name. As an illustration—the recent legislature of New York passed two bills, the "Murtaugh" bill and the "Walters" bill, which were submitted to the governor. After a hearing, at which representatives of the great civic bodies of New York appeared in opposition, the governor vetoed the bills. The facts, however, are of importance because they will bear on future legislation, and, therefore, are stated here:

The Constitutional Convention of New York, of 1894, adopted a policy of inaction until the problem of conservation might be understood, and an amendment to Section VII, Article 7, of the Constitution, relating to the preservation of the forests, was adopted as the fundamental law of the State for twenty years, i. e., until the next constitutional convention should be held. This amendment provided that: "The land of the State now owned or hereafter acquired by the forest preserves, as now fixed by law, shall be forever kept as wild forest lands, and shall not be leased, sold or exchanged or taken by any corporation, public or private, nor shall the timber thereon be sold, removed or destroyed."

Amendments to this article have from time to time been introduced in the legislature, but have failed of passage. In the meantime, through investigation and report, a great mass of data has been accumulated upon this question in an effort to reconcile private interests with State ownership and control.

As a development of the policy of constructive administration, a bill known as the "Burd Amendment to the Constitution" was passed by the legislature of 1911 and again by the legislature of 1913. This amendment provides that—

"The legislature may by general laws provide for the use of not exceeding three per centum of State lands for the construction and maintenance of reservoirs for municipal water supply, for canals of the State and to regulate the flow of streams,"

and contains additional provisions as to construction, ownership and control by the State, and other matters relating thereto. This amendment is to be submitted to the people of the State of New York for adoption. In anticipation of this amendment, and before a public policy incident to its consideration is determined upon, the legislature passed the two bills above mentioned, which would have given to the Conservation Commission unusual powers.

The "Murtaugh bill" provides for the utilization of surplus canal waters for hydraulic power, and the development by the State of the power therein for the use and benefit of the people of the State. Under the provisions of this bill the Conservation Commission may construct and operate hydro-electric plants and transmission lines for supplying electricity to municipalities and persons within the State.

This introduces a new element, in that it provides that the State may enter into the market for the sale of water to consumers in competition with corporate or private business. The significant point of variance is this: The bill puts in the hands of the Conservation Commission broad powers and rights free from control of the Public Service Commission, and permits it to sell electric light and power at prices not subject to review by the Public Service Commission, which has the right to regulate prices to all cor-

porations now engaged in selling electric light and power. This is a radical departure from the now well established policy of the State in the matter of regulated monopolies, and sets up the Conservation Commission as an additional "overlord." It invites confusion and discrimination.

The "Walters bill" provides that—
"Three or more persons may become a corporation for the purpose of impounding and storing water * * * improving navigation, developing hydro-electric power, supplying water for potable, municipal, * * * and other uses, or for two or more such uses."
and that—
"Any such corporations may acquire by purchase or condemnation the property of municipal, railroad and transportation corporations required for its coporate purposes The power of condemnation hereby given any such corporation shall be paramount as against all except the State."

This involves a power dangerous, unheard of and entirely opposed to the rights of persons and property. It makes three or more persons, incorporated, the overlord with power of condemnation of municipal property. It could condemn a water supply property of any municipality and proceed as if it were private property. It can underbid regulated monopolies and defeat the policy of the State, independent of the jurisdiction of the Public Service Commission, for—
"Such a corporation shall be quasi-public and subject to the jurisdiction of the Public Service Commission of the Second District as to the issue of all stock and bonds * * * the fixing of annual charges to be charged or exacted except such as are *fixed by contract.*"

Under this act quasi-public service corporations can start an improvement upon a stream, issue bonds, and the riparian owner is obliged to accept the improvement with the additional burden of the bond lying against the real estate, with practical power of confiscation. And a grim sense of humor must have dictated the following:
"Every such corporation shall be operated without profit to its stockholders, but * * * the surplus income shall be ratably rebated."

A difference in words but not in substance. The net income or profit is "paid to the parties who shall have paid for benefits."

It is not possible to foresee the excesses to which such a law may give rise. The courts in New York have unanimously held that the taking of water power property constitutes the taking of private property for private use, and any statute making this permissible is unconstitutional. The enterprise is in substance a private one, and the pretense that it has a public purpose is merely colorable and illusory. The taking of private property for private use cannot be authorized even by legislative act, and the declared purpose is not sufficient to bring it within the right of eminent domain.

As has been said, while the problem of the interstate stream in the West is that of irrigation, in the East it is largely a problem of the potable use of water and of pollution. At the time when the City of New York entered upon the development of an additional supply of water from the Catskill Mountains it had under consideration the Upper Housatonic and the Ten Mile rivers as an extension of the Croton watershed. That would have been a logical and economical development of the watershed, but under a decision of the United States Circuit Court of Appeals, handed down in 1901, enjoining the City of New York from diverting the waters of the Byram River as an interstate stream, the City of New York was forestalled from such use. Furthermore, even if the City could have used that water, it would have had no power of control over the pollution entering into the streams when flowing through the States of Massachusetts and Connecticut.

The Conservation Commission of New York was appointed in 1911. It is a consolidation of the Water Storage Commission of 1902, the River Im-

provement Commission of 1904, and the Water Supply Commission of 1905. The powers of these three commissions were at first limited to the survey of lakes and streams for canal, navigation and power purposes; to the investigation of the causes of the overflow of the rivers and other water courses of the State; to the determination of public necessity for new and additional water supplies for the municipalities of the State, and to devise plans for the progressive development of water power under State ownership, control and maintenance for the public use and benefit and for the increase of public revenue.

The citations given above of some of the States are type forms of conditions prevailing throughout the United States. They illustrate the necessity for the standardization of legislation in the interest of the public at large.

In a report which the writer made as chairman of a special committee on conservation of the Chamber of Commerce of the State of New York, February 14, 1912, under the head of "Power Development," appears the following:

"The fundamental elements in the conservation of life are light, air and water, and by use these are conserved for the benefit of mankind, and are free and common to all the people. Vested rights in these elements, in their natural state, are an anomaly; no one person may intrude therein a claim for vested rights against the common interest of all.

"To classify water as 'Real Estate'* and apply the theory of vested rights to it resolves itself into an entanglement of legal technicalities and controversial rights, from which there is no exit. The theory that the rainfall on its way to the sea may be corraled by one person to the exclusion of all others cannot stand, for the reason that *it is neither good law nor good sense.* The riparian owner of the stream may exclude his neighbor to low water mark and may use the stream as it flows by, but the fact that he has a vested right on the adjacent land and banks of the stream should not carry with it an inherent right in the *water which flows past that bank.* That water is free for the common use of all.

"This principle of the common use of water must be clearly understood before the question of conservation and development of stream flow for power purposes can be taken up for consideration."

This doctrine has now become law, for on May 26, 1913, the Supreme Court of the United States decided that the Government was not required to pay the Chandler-Dunbar Water Power Company $550,000, as adjudged by a Michigan Federal court, for power appurtenant to land condemned for the construction of additional locks and canals at St. Mary's River. It was held that the *flow of a navigable stream* was in no sense the property of the owner of adjacent land or of the owner of the bed of the river. While this decision of the Supreme Court is restricted to the flow of a navigable stream in order that it may be brought within the commerce clause of the constitution, which gives the Federal Government control of navigation, it can not change the right of the public in the use of water which is the result of rainfall; that is an inherent right which belongs to the people which the Constitution defines but does not give. This decision is regarded as a precedent-making one and as a decided victory for the conservation of natural resources.

Furthermore, in this connection, the passage of the "Weeks" law, authorizing the protection of forest lands which lie upon the watersheds of navigable streams, is of great importance, not only because of the direct results which will be obtained through the maintenance of national forests, but because it is a direct recognition of the interests

* Laws of 1905, Chapter 724, An Act to provide for an additional supply of pure and wholesome water for the City of New York, under which the Board of Water Supply is proceeding, Section 25. "The term *real estate* as used in this act shall be construed to signify * * * the *waters of any lake, pond or stream.*"

of the public in the control of forest lands situated in mountain regions and of the streams that flow therefrom, and a recognition also that the participation of the public itself is necessary to secure this control.

The above-mentioned decision of the Supreme Court makes constitutional an act of Congress for Federal control over flowing waters of navigable streams, whether interstate or intra-state.

All water law as interpreted under the statutes of the various States is susceptible of uniform codification. Not until an act of Congress is passed under a broad interpretation of the Public Welfare Clause of the Constitution, covering the entire control and utilization of interstate waters, recognizing and supplementing the Commerce Clause and the police powers of the government, can the situation be wholly met. Under such an act the uncivilized use of flowing streams as sewers and for receiving polluting factory discharges can be stopped.

Already the Federal government is embarking upon the policy of national control of water; the Carey Act, the Weeks law, and now this last decision of the United States Supreme Court, make possible a national policy which will in time become effective through law. Heretofore confusion incident to concentration of interest in each detail of conservation by the group promoting that detail (water storage, power development, irrigation, inland waterways, or what not) has nullified real progress, and until the whole scheme is directed by a controlling body which shall see each part related to the whole, progress will be delayed.

New York, California and Oregon represent respectively the principles of riparian rights, of modified riparian rights and of appropriation. New York State through the Conservation Commission, and Oregon through its Board of Control, are applying the principles of their respective States. There are no similar commissions in any of the other States, but as the law of water rights comes to be better understood under the spur of economic necessity, all the States will undoubtedly have such commissions. Interstate waters, forests at the sources of streams, use of rivers for sewage by the States through which the interstate streams flow, are beyond the jurisdiction of the individual States and are matters for Federal jurisdiction; therefore a Federal commission should be appointed.

The author suggests the following:

That a Federal commission, to be known as the Board of National Water Conservation, be created by Congress, the term of office to be indefinite in order to secure continuity of plan and continuity of action through different administrations. To be effective the commission should be free from political control, from personal interests and from the confusion of counsel inherent in large bodies. It should be preferably small that the sense of responsibility may not be divided. A large board is apt to be cumbersome and unwieldy and hence more or less inefficient. The proposition to create a large board, consisting of expert heads of various departments of the United States, in order to bring into the work the activities of these departments, is but to subtract time from the intelligent supervision of those departments, whereas this commission should devote its entire time to the work. Experts are needed; as consultants their services can be more properly obtained.

The commission should be an independent, non-partisan board, composed of men of experience in large undertakings, in a word, trained men of general affairs, for the success of so great an undertaking is largely conditioned upon the judgment of men uninfluenced by the pride of professional training. It should be appointed under a constructive act that shall be flexible and adapted to meet all the conditions outlined in this article.

The general plan of work should contemplate:

1. Public education by agitation and discussion.

2. Legislation. Revision and codification of existing laws and passage of

new laws coordinating Federal and State jurisdiction over waters and waterways.

3. Study of conditions relating to: a. Preservation of forests and reforestation. b. Control of spring freshets, by means of storage reservoirs, lateral canals, dikes, levees, etc. c. Recovering desert and waste lands by irrigation and tree planting, and swamp lands by drainage.

4. Study of the utilization of rainfall: a. For potable purposes as by preservation of watersheds:

1. Legislative acts.
2. Sanitary control.
3. Municipal application, subject to State supervision.

b. For commercial use:

1. Development of hydro-electrical and other power and control thereof.
2. Navigation, or water transportation. Aided by — a. Storage reservoirs. b. Regulation of stream flow and waterways. c. For irrigation.

To conclude, the rules and regulations governing the control of water, as handed down from the past, are crude and empirical. They entail confusion in the distribution of a national asset. The remedy lies in the standardization of legislation and the practical application of co-ordinated laws by competent commissions—State and Federal—each exclusive within its proper jurisdiction.

GOOD RESULTS FROM DIRECT SEEDING

PINE seed sown directly in the spots where the trees are to grow is yielding good results in young trees on the Tahoe National Forest in western California.

This is in marked contrast to the usual results in such cases, because squirrels, mice, and birds will eat the seeds where they are planted without protection, and even when these enemies allow the seed to germinate, the drying out of the soil in drouth periods is usually too much for the tiny seedlings during their first season.

Because of these vicissitudes foresters usually find it advantageous to grow the seedlings in nursery beds, where seeds and plants can be protected by wire screens and shade frames, and where water can be applied when needed. Usually, too, the seedlings are transplanted once or twice before they are set out in their final situation, the transplanting process serving to develop stocky plants with compact sturdy roots. While the nursery bed and transplant process involves more work, it is said to be generally cheaper in proportion to results accomplished, particularly when the cost of seed is taken into consideration.

The California experiment, which indicates the possibility of direct seeding of certain speces in some localities, was conducted on an area of 22 acres, sown in the fall of 1910 to Jeffrey pine. A large number of seedlings have become thoroughly established and have made thrifty growth. The plantation is at an altitude of 6,000 feet where there is more moisture than at lower elevations.

When the seeds were planted they were coated with red lead to discourage mice and other rodents, but so far as the forest officers could find out the lead coating had no such effect; not enough of the seed was eaten, however, to destroy the value of the planting.

More than one-fourth of all the sheep in the eleven States nearest the Pacific Coast are grazed on the National Forests.

The National Forests contain water powers with an aggregate estimated capacity of 12,000,000 *horse-power, available for use under permit from the Secretary of Agriculture.*

EDITORIAL

CONGRESSMAN W. F. Humphrey, of Washington, in a recent article in *American Industries,* and in a speech which he is distributing, makes a number of absurd exaggerated statements regarding the Forest Service and the American Forestry Association. Were it not that some people might be led, by the apparent accuracy of Mr. Humphrey's statements to believe what he says, we would pay no attention to his declarations. For the sake of those who may be misled by his assertions, however, we append some facts.

Mr. Humphrey asserts that if the land included in the National Forests "was taxed by the State of Washington the same as private timber holdings it would give to that State annually $7,593,500."

The Bureau of Corporations' report on standing timber in the United States shows something less than 395 billion feet of privately owned timber in the State of Washington, as against something less than 86 billion feet in the National Forests of that State, or about 3½ times as much private as National Forest timber. On this basis the State should be deriving from its private timber a revenue equal to $7,593,500 x 3½, or around $26,000,000. The State board of tax commissioners reported the total revenue raised by taxes in the State in 1910, *from all kinds of property,* as slightly over $27,000,000. The timberlands of the State paid about 8½ per cent of this total. The assessed valuation of the State's timberlands was a little less than $77,000,000.

The net area of the National Forests in Washington is not quite 10,000,000 acres, with an estimated average stand of between 8,000 and 9,000 board feet to the acre. Would Mr. Humphrey desire prospective investors in his State to understand that such lands are taxed at a rate of about 75 cents per acre per year?

But about three-fourths of the National Forest area in Washington is unsurveyed land, which would necessarily remain untaxable until it is surveyed because no private title could be acquired. In his last paragraph in the article referred to Mr. Humphrey states that in the last ten years the Forest Service has taken from the State of Washington $75,900,000. This is evidently intended as an estimate of the amount of taxes which the State has lost in that time. If every acre of land that has been surveyed to date had not only been opened to entry but had been actually acquired by private owners ten years ago, according to Mr. Humphrey's figures the State would have taken from these owners during the last ten years, $30 for each acre owned, or $3 per acre per year.

Mr. Humphrey asserts that $10,000,000 worth of over-ripe timber now rots in the Government's forests each year in Washington, which could be cut without in the least reducing the supply. The bulk of the timber in the National Forests in Washington is not today salable to lumbermen for immediate removal at any price. It must wait for its market until more of the nearly 300 billion feet of privately owned timber in the State has been cut. The timber which is at present too far from means of transportation to pay the cost of getting it out could be cut only on condition that the Government would pay the man who cut it a bonus, besides giving him the timber, to cover what he would otherwise lose. Will Congressman Humphrey introduce a bill providing for this expenditure, if he regards it as sane conservation?

Mr. Humphrey holds that "keeping all this vast tract of timber off the market greatly enhances the value of private holdings of the Weyerhausers, the railroads, and others." Precisely. The way to protect the public against monopoly is, of course, for the Government to sell off or give away all the timber it has as

rapidly as possible and leave the monopoly in full and undisputed control of the situation.

These are jokes. But one part of Mr. Humphrey's statement is not a joke. He asserts that "Under pretense of preserving the forests for the people, without protest from those connected with the Forest Service, the Santa Fe Railroad was permitted to exchange 1,300,000 acres of land covered with sage brush and cactus, absolutely treeless, and worth from 5 cents to 25 cents an acre, for an equal number of acres of the best land on the public domain, some of it the most valuable timbered land in the United States, and worth today $200 per acre."

He also asserts that, without protest from the Forest Service, "the Northern Pacific Railroad was permitted to trade 690,000 acres of barren and practically worthless land composed mostly of the crest of high mountain ridges above timber line, consisting of rocks and glaciers, for an equal number of acres of fine timber land in the Pacific Coast States."

These charges refer to lands obtained as lieu land selections. They have been made by Mr. Humphrey before, and are of a piece with charges of a similar tenor bringing into question the motives and good faith of the American Forestry Association. Briefly, Mr. Humphrey would now persuade the public that those who have stood for the cause of forest conservation have been and are the tools of predatory interests; and Mr. Humphrey would now persuade the public that he is their champion against these interests. To this end he has been rash enough to specify concrete cases in which the facts are a matter of record.

Lieu land-selections were made possible by a clause in the law providing for the administration of the National Forests, passed June 4, 1897. The avowed purpose of this clause was to permit settlers on public lands subsequently included within National Forests to exchange their claims or patented homesteads for public lands outside the forests. But the privilege was not confined to settlers. The result was to open the door to the surrender of vast amounts of worthless land to the Government, by railroads and others having large holdings of western lands, in exchange for the right to select equal areas of the best land to be found elsewhere on the public domain.

The provision of law which permitted these exchanges was repealed by Congress on March 4, 1905. In the discussion in the House of Representatives on that day it was said by Mr. Jones, of Washington: "I do not believe that there is any law which has been placed on the statute books that has been the source of so much fraud as this law, and the other charges made against the land laws in this country can be traced to the lieu selection law." Mr. Fordney, of Michigan, said: "Absolutely worthless lands have gone to the Government in lieu of the very best lands the Government owns in any State in the union. * * * Any man would be a most infernal fool if he owned worthless land in a Government reserve who would not immediately hasten to some land office and dump that valueless land upon the government, knowing that he can get land elsewhere worth from $5 to $50 an acre. * * * It is an absolute fraud. The man who originated it certainly made a grievous mistake or committed a very great fraud to offer any such law."

The administration of the National Forests while this law was in force was in the hands not of the Forest Service but of the Department of the Interior. Prior to the transfer which placed the Forest Service in charge, its responsibility was confined to recommending lands for addition to the forests or for new forests. When the law was finally repealed Mr. Lacey said: "The future reservations *have been held up* for fear of forming a base for looting the timber in Oregon and Washington."

Mr. Humphrey was a member of the Congress which, after much pressure and delay, repealed the bad law. That law permitted the consolidation of great areas of valuable timberland in Mr. Humphrey's own State, in the hands of the monopolists against whom Mr. Humphrey now clamors. But did he

clamor when there was need for clamoring? There is not a word in the *Congressional Record* from him on the subject. He took no part in the debate, and he introduced no bill. Yet the legislative record in connection with the tardy repeal of that bill reeks of scandal.

While Mr. Humphrey was silent, the American Forestry Association was not. On December 9, 1903, for example, the Association at its annual meeting urged "the passage by Congress of an amendment to the law regarding exchange of lands included within a forest reserve, so that such exchanges or lieu selections shall be confined to lands of equivalent value or similar conditions as regards forest growth." This resolution was published in the magazine for January, 1904.

On September 30 of the present year, more than eight years after the law was repealed, Mr. Humphrey introduced: "A bill repealing the law providing for the exchange of public lands for lands within forest reserves." He is a little late in his activities. It would be more becoming for him to explain why he was not active earlier, when the steals were going through in his own section, when the country was ringing with the scandals of these steals, and when Congress, the only body with power to stop them, was being called upon to act. He must think that men's memories are short.

EDUCATIONAL NOTES

The School of Agriculture of the Pennsylvania State College will hold an Agricultural Fair on November 7, the event being that of Pennsylvania Day, corresponding to Founder's Day in most colleges. At this fair the Forest School plans for an extensive exhibit, one which in general will be of the general educational nature along forestry lines. Particular stress will be laid upon the agricultural features of forestry. A particular feature of the exhibit will be a forest map constructed of veneer, showing advantages of such a map system for lumbermen conducting lumbering with a view to conservation.

Through the Forestry Society of the Pennsylvania State College a friend of forestry has offered two annual prizes, open to all members of the society, for the best papers of a technical forestry nature delivered before the society. The first prize is for $7.50 and the second for $2.50. This is expected to create an interest in the writing of technical material among the students, and will greatly help in their future work.

Prof. William R. Lazenby, head of the Forestry Department of the Ohio State University, announces in a circular for the convenience of those interested in the school that the new building for the forestry school will be completed next year. The following compose the instructional staff on forestry subjects for the first semester: Wm. R. Lazenby, M.Agr., For. Eng., forest relations, silviculture, and forest economics; Norman N. Scherer, M. For., elementary forestry, forest protection, mensuration; Otto W. Pflueger, B.S. For., elementary forestry, forest management; Alfred Dachnoski, Ph.D., physiological ecology, forest botany; John H. Schaffner, M.S., dendrology; Arthur G. McCall, B.S. Agr., forest soils; George F. Schlessinger, C.E., forest engineering; William D. Turnbull, C.E., engineering drawing.

The Western Forestry and Consevation Association will hold its annual conference about December 15. This year it will meet at Vancouver, B. C., and will give its main consideration to the problem of forest fire prevention and control.

FORESTRY AT THE CONSERVATION CONGRESS

FORESTRY is to be the most important topic of discussion at the fifth annual National Conservation Congress, which is to be held in Washington, D. C., on November 18, 19 and 20. So important are the forestry addresses and debates to be that the American Forestry Association has sent invitations to all its members to attend the congress and participate in its forestry work, in lieu of any general forestry conference at the annual meeting of the association in January. It is expected that several hundred of the members will be present.

The program committee, at this writing, has arranged that the chief addresses on forestry before the whole Congress shall be at the afternoon session of the congress on November 19, and the morning session on November 20. President Henry S. Drinker, of the American Forestry Association, has been invited by President Charles Lathrop Pack, of the Conservation Congress, to preside at the first of these sessions.

The tentative program, in which some changes may yet be made, provides for the following addresses before the congress:

Federal Forestry Work, by Henry S. Graves, Chief Forester of the United States.

State Forest Work, by Dr. Filibert Roth, dean of forestry at the University of Michigan.

Private Forestry Work, by E. A. Sterling, of Philadelphia, a noted forest engineer, and a director of the American Forestry Association.

Who Shall Control National Forests?, by J. N. Teal, a prominent conservationist of Portland, Ore.

The Lumbermen's Point of View, by George S. Long, of Tacoma, Wash., one of the leading lumbermen of the Northwest.

Public Knowledge of Forest Economics, by E. T. Allen, secretary and forester of the Western Forestry and Conservation Association and an authority of forest management.

An address, the subject of which has not yet been specified, by Capt. J. B. White, of Kansas City, Mo., former president of the National Conservation Congress and a director of the American Forestry Association.

In addition to these addresses there will be, during the entire period of the congress, except when the sessions are devoted to forestry matters, a forestry conference of foresters and lumbermen from all over the United States and Canada. This sectional meeting will be held in the Cabinet Room on the second floor of the New Willard Hotel. At this sectional meeting will be presented the reports of the ten sub-committees of the Forestry Committee of the congress.

The Forestry Committee, consisting of Henry S. Graves, chairman; E. T. Allen, Capt. J. B. White, W. R. Brown, E. A. Sterling, secretary, and Charles Lathrop Pack, ex-officio, was appointed a year ago, at the congress in Indianapolis, to investigate the most important problems in forest conservation. The committee appointed ten sub-committees, whose investigative work, during the year, was financed by a fund of $5,000 secured through the American Forestry Association.

These committees are as follows:

No. 1. Publicity. Chairman, E. T. Allen, Portland, Ore.; T. B. Wyman, Munising, Mich.; F. W. Rane, Boston, Mass.; P. S. Ridsdale, Washington, D. C.; O. W. Price, Washington, D. C.

No. 2. Federal Forest Policy. Chairman, Jos. N. Teal, Portland, Ore.; Hon. A. F. Lever, Lexington, S. C.; Robert P. Bass, Peterboro, N. H.; E. G. Griggs, Tacoma, Wash.; F. E. Olmsted, Boston, Mass.

No. 3. State Forest Policy. Chairman, William T. Cox, St. Paul, Minn.;

F. A. Elliott, Salem, Ore.; C. R. Pettis, Albany, N. Y.; H. H. Chapman, New Haven, Conn.; J. E. Rhodes, Chicago, Ill.

No. 4. Forest Taxation. Chairman, Gifford Pinchot, Washington, D. C.; F. R. Fairchild, New Haven, Conn.; Dr. H. S. Drinker, So. Bethlehem, Pa.; E. T. Allen, Portland, Ore.; E. M. Griffith, Madison, Wis.

No. 5. Forest Fires. Chairman, C. S Chapman, Portland, Ore.; D. P. Simons, Seattle, Wash.; F. H. Billard, Berlin Mills, N. H.; J. S. Holmes, Chapel Hill, N. C.; Coert DuBois, San Francisco, Cal.

No. 6. Lumbering. Chairman, R. C. Bryant, New Haven, Conn.; G. M. Cornwall, Portland, Ore.; J. B. White, Kansas City, Mo.; J. F. Clark, Vancouver, B. C.; F. A. Silcox, Missoula, Mont.; C. B. Martin, Aberdeen, Wash.; Adam Trieschmann, Crossett, Ark.; W. R. Brown, Berlin, N. H.

No. 7. Forest Planting. Chairman, E. H. Clapp, Washington, D. C.; T. T. Munger, Portland, Ore.; S. N. Spring, Ithaca, N. Y.; S. B. Detwiler, Philadelphia, Pa.

No. 8. Forest Utilization. Chairman, R. S. Kellogg, Wausau, Wis.; Bruce Odell, Cadillac, Mich.; W. C. Miles, Globe, Wash.; E. A. Ziegler, Mt. Alto, Pa.

No. 9. Forest School Education. Chairman, J. W. Toumey, New Haven, Conn.; Walter Mulford, Ithaca, N. Y.; C. H. Shattuck, Moscow, Ida.; Geo. S. Long, Tacoma, Wash.; W. B. Greeley, Washington, D. C.

No. 10. Forest Investigations. Chairman, Raphael Zon, Washington, D. C.; F. B. Laney, Washington, D. C.; Walter Mulford, Ithaca, N. Y.; C. G. Bates, Denver, Col.; A. G. McAdie, San Francisco, Cal.

At the sectional forestry meeting the forestry committee, and each of the sub-committees, will present a report which will be discussed in detail, and out of these reports and discussions it is expected there will be developments of the utmost importance to forestry and lumbering.

Another feature of interest to foresters and lumbermen will be a forestry banquet, to be given at Rauschers, on the evening of November 19. A thoroughly enjoyable and substantial dinner will be followed by a number of short addresses by leading foresters and lumbermen. It will be in the nature of a "get-together" affair. Mr. Charles Lathrop Pack, president of the congress, has consented to preside at the banquet, and a number of men high in official life are to be among the guests. The banquet is in charge of members of the Forestry Committee of the Conservation Congress, the National Conservation Association, and the American Forestry Association. Requests for seats should be sent to P. S. Ridsdale, secretary of the American Forestry Association.

Squirrels collect much of the seed used for planting by the Forest Service.

A growing scarcity of willow, generally used for wooden shoes in Europe, is leading to an adoption of poplar.

Torrey pine, a distinct California species, has been found in only two isolated localities in the southern part of the State.

One hundred acres on the Florida National Forest will be sown to maritime pine seed this fall. Maritime pine is the source of the French turpentine industry.

San Francisco recently received its first cargo of lumber from the Tongass National Forest, Alaska. The shipment consisted of 1,500,000 feet of Sitka spruce.

Washington stands first in lumber production, with Louisiana second.

Much of the piling, wharf material, and lock gates of the Panama Canal are made of greenheart, said to be the most durable wood known for these purposes, which comes mainly from British Guiana.

There are about 37 pines native to the United States, of which 25 are Western species, and 12 Eastern.

A STANDARDIZED WOOD PRESERVATIVE

ONE billion fence posts and fence rails are used in the United States every year. The average life of the posts is from three to eight years, according to the kind of wood used. The average life of the rails is longer because they do not come in contact with moisture of the ground.

Now most of these posts and rails are used by farmers and small property owners, and many of them are cut off small woodlots owned by the users.

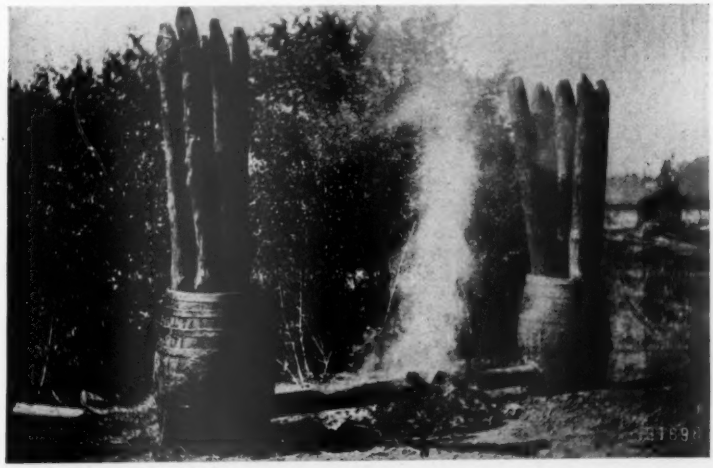
If it is possible to so treat these posts and rails—and other woods used for different purposes—at a comparatively slight cost, with a wood preservative that will double or triple their life, it is natural to suppose that every wide-awake wood user will realize the value of a preservative treatment.

That many do not is due, doubtless, to their ignorance of the prices of such preservatives, to the method of treatment, and to the cost of installing a preserving plant.

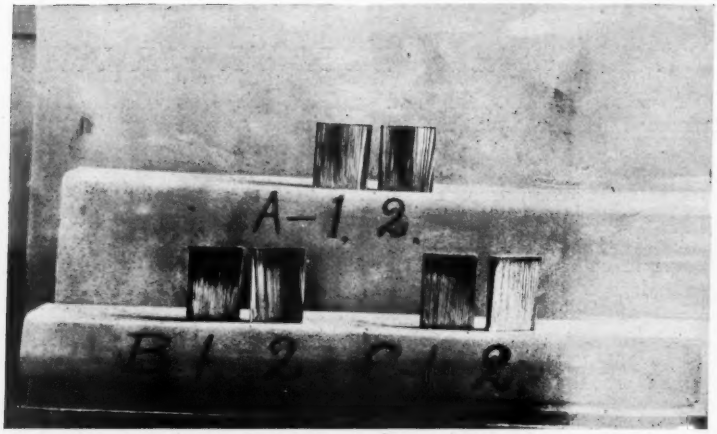
To meet the needs of the farmer, the builder, the small or isolated street electric or steam railroad, the telephone or electric power company, to whom the only methods of treatment open are those of slight cost, there has recently been placed on the market a standardized grade of refined coal tar creosote oil, especially designed for the open tank treatment, dipping, brushing or spraying. All these are simple and inexpensive, and available for the small user of wood in whatever part of the country he may be.

Ordinary creosote oil, commonly used as a wood preservative in the pressure treatment, has several characteristic properties which make it objectionable for the sort of treatment available to the small user. These properties are water in varying amounts, the presence of salts, such as naphthalene, that solidify, making it difficult to remove the oil from the containers; and the presence of light oils distilling below 210° C., which evaporate rapidly, carrying some of the higher boiling oils with them.

The standardized grade of refined

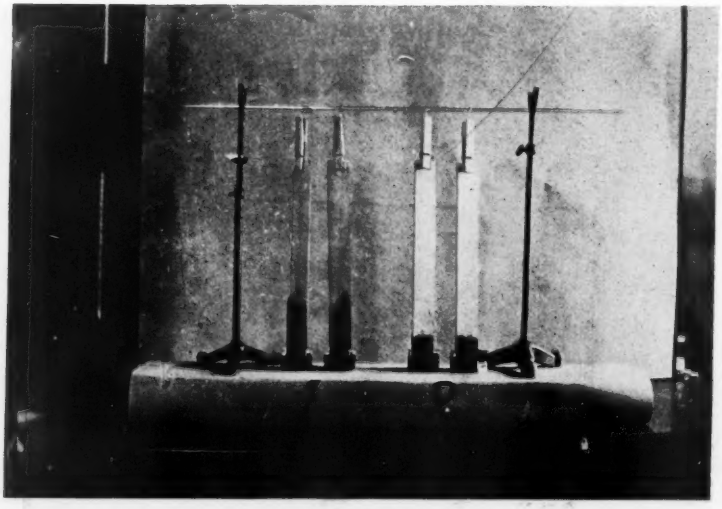


PRIMITIVE OUTFIT FOR TREATING POSTS, CONSISTING OF TWO BARRELS CONNECTED BY AN IRON PIPE.
A fire is built around this pipe which heats the oil in the barrels. (Used at Clemson College, S. C.)



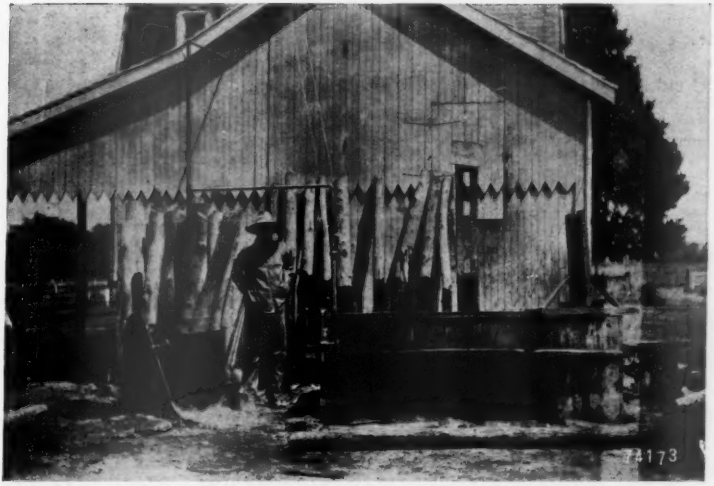
THIS PICTURE ILLUSTRATES THE PENETRATION OF THE OILS INTO (A) CYPRESS; (B) WHITE CEDAR; (C) CHESTNUT.

Specimen 1 was treated with Grade one Liquid Creosote Oil, and Specimen 2 with a well-known commercial creosote, in each case. The penetration of the cypress is hardly visible in the photograph, but as clearly shown in the case of the white cedar and chestnut, there was greater depth of penetration in Specimen 1 than in Specimen 2.



THE SMALLER PICTURE SHOWS THE ABSORPTIONS OF GRADE ONE LIQUID CREOSOTE OIL AND A WELL-KNOWN COMMERCIAL CREOSOTE BY STRIPS OF WHITE WOOD.

As shown in the picture, the ends of the strips were immersed in small dishes of oil, and allowed to remain for several hours. Specimens 1 shows the penetration of Grade one Liquid Creosote Oil, and Specimens 2 the penetration of the other creosote, under identical conditions.



TANKS USED FOR TREATMENT OF FENCE POSTS BY HAVING TWO TANKS. One may be used for giving the hot bath and the other for the cold bath, thus hastening the treatment. (Used at College Park, Md.)

coal tar creosote oil, for an analysis of which the writer is indebted to Mr. S. R. Church, of the Barrett Manufacturing Company, which has put on sale Barrett's Grade One Liquid Creosote Oil to meet the need of the small user, is made up especially to overcome the difficulties attending the using of ordinary creosote oil.

The analysis shows that the oil is a very high grade of coal tar creosote oil, especially refined for the removal of all low-boiling constituents and solids. In its distillation range it comes midway between ordinary commercial creosote and anthracene oils.

It is admitted that the refined creosote, on account of its larger percentage of oils distilling below 300° C., will lose more by evaporation than most anthracene oils if exposed in the same way, but on the other hand, the refined creosote, on account of its much less pronounced stickiness, will penetrate more deeply into the wood.

In treating wood with preservatives the small user must understand that the degree to which the refined creosote penetrates the wood is an exceedingly important consideration. In order to prevent decay a preservative must reach wherever air and moisture can enter. If this were not true it would be a waste of money to give timber anything more than a superficial treatment such as brushing or spraying in the same manner as paint is applied.

Experts in treating telephone and telegraph poles declare that the all im-

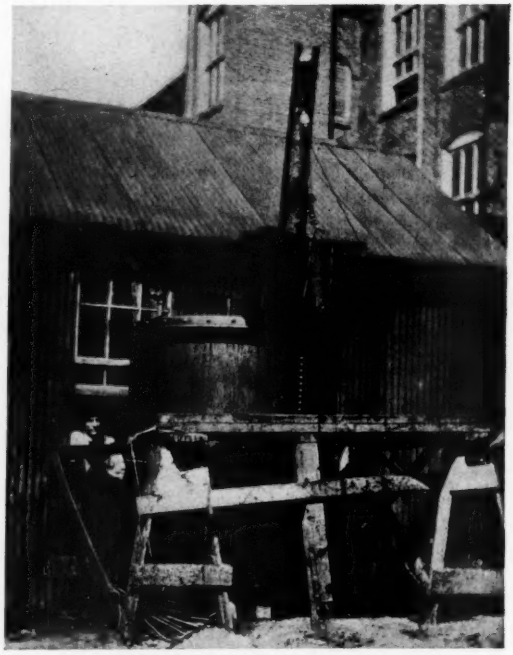
THE RIGHT WAY TO PILE FENCE POSTS FOR SEASONING. AUBURN, CAL.

portant thing is to get the greatest possible penetration of the oil, and many of them believe the oil is bound to last longer in the exterior ring than the pole can last, because of checks and cracks which will permit the entrance of air and moisture into the untreated portion of the wood.

In wood preserving it is important to know that the preservative will not penetrate bark. The bark and the inner skin should be removed and the timber should be thoroughly seasoned in order to secure the best results. Farmers do not have to be told how rapidly fence posts rot off and decay at the ground line, yet by proper preservative treatment even the portion of the posts in contact with the moist ground may be made to last two or three times as long as do untreated posts. The treatment of these posts is easy and comparatively cheap. An open tank may be secured for twelve to fifteen dollars, the standardized oil costs twenty-five cents a gallon, or in carload lots, twenty cents a gallon. The tank can be raised a foot or two above the ground to allow space for a fire underneath it, and the posts can then easily be dipped in the boiling oil. The same treatment can be applied to wood used for beams, flooring, shingles, silos, steps, etc, and long boards which it is not possible to place in small open tanks may be treated by a liberal coating of the hot oil after the boards are in place.

The oil in the open tanks should be heated to about 220° F., and the posts, rails, etc., should be immersed in the oil at this temperature for from one to three hours, according to the kind of wood, and then transferred to another tank of cold oil, or allowed to remain in the same tank until the oil has cooled. This will result in a penetration of one to two inches on soft woods such as poplar, or sap pine, and on the hardwoods a quarter to half an inch if the wood is well seasoned.

It is wise for the small user who plans to treat what timber he is to use, to apply to one of the State Agricultural Experiment Stations or to the United States Department of Agriculture for detailed instructions on how to get the best results, etc.



TANK FOR CREOSOTING SHINGLES, POSTS AND OTHER SMALL TIMBERS.
(Used at Clemson College, S. C.)

Paraguay has valuable forest resources, the most important of which is quebracho, particularly rich in tannin.

Much of the cork used throughout the world comes from Portugal, which harvests about 50,000 tons a year.

FOREST NOTES

The number of persons who spend their summer vacations within the national forests is growing so rapidly, says the Forest Service, that the question of providing suitable pasturage for their saddle and pack animals is becoming a problem. Campers naturally seek the spots where water is close at hand and where horse feed is abundant, in the hope that their stock will not be tempted to steal away in the night in search of more tempting pasturage. In order to provide such spots the Forest Service must set aside limited areas from which sheep and cattle are excluded.

* * *

Secretary Houston has granted a permit to the Southern California Edison Company for the development of additional electric power on the Kern national forest to supply Los Angeles, Pasadena, and neighboring towns. This company operates seven hydro-electric plants, one of which is on the Kern and five others on the Angeles national forest. The six plants on the national forests are capable of developing 37,000 horse-power, although there is not sufficient power in the streams to develop such an amount of power continuously. The company has installed, therefore, a number of auxiliary steam plants, which have a total capacity of about 54,000 horse-power.

* * *

A marked increase in the quantity of live stock grazed on national forest ranges during the past fiscal year is reported by the Forest Service. Nine and a half million domestic animals have been occupied during the summer in converting one of the by-products of the forests into meat, hides, and wool. In addition, there were in round numbers three hundred thousand calves and colts and five million lambs and kids exempt from permit and therefore not enumerated. According to the figures gathered, the amount of stock grazed under permit during the year is over 4 per cent greater than for the previous year, while the number of permittees using the forests for pasturage purposes was increased from 26,501 to 27,466. The total receipts by the Government from grazing fees for the twelve months ending June 30, 1913, were $1,007,739, and the portion of this applied to schools and roads in the States in which the national forests are situated is about $352,708.

* * *

President Wilson has signed a proclamation which eliminates some 144,420 acres from, and adds about 6,680 acres to the Jemez national forest, New Mexico. The areas taken out of the forest have been removed with a view to excluding open lands, and scattering stands of woodlands not needed for the protection of important watersheds and of such quality that the expense of protecting and administering them is not justified. It includes several tracts of varying size. One tract contains something more than a township, or 36 square miles, lies at the extreme northwest corner of the forest, and bears a scattering stand of pinon and juniper, together with a small amount of pine. The Gallinas valley, a long strip of rolling, open country in Ts. 23 and 24 N., Rs. 1 W. and 1 E., is also eliminated, as is all of the mesa country lying west of the town of Cuba, with the exception of about twelve sections of mountainous pine-covered land immediately adjacent to the Cuba valley.

* * *

David Z. T. Yui, formerly secretary to the vice-president of the Chinese Republic, is now traveling in this country to learn modern methods for adoption in China. He is at present in charge of the lecture board of the Chinese Y. M. C. A., which is in close touch with the new Government and is aiding in putting into effect an educational campaign for the citizenship of the republic. While in Washington recently Mr. Yui spent some time investigating the work of the forest service, in order that he might find out whether its organiza-

tion and methods would be of value to the newly created department of agriculture and forestry in China. In speaking of this part of his work, Mr. Yui said: "In the matter of forest conservation the United States profited much by looking upon the disasters which were the result of the Chinese neglect of forestry. This was a great warning to you. Now we wish to profit by the improved methods of forestry which the United States has discovered and applied."

* * *

Grazing is second only to lumbering as a principal use of the national forests. Practically all of the national forests used extensively for grazing purposes are within the eleven States extending east from the Pacific coast, known as the "far western group." These States contain, according to latest reports, 8,546,000 cattle, 2,810,000 horses and mules, and 28,366,000 sheep. The national forests support in these States 17 per cent of the total number of cattle grazed, 3.48 per cent of horses and mules, and 27.5 per cent of sheep. It is estimated that the annual product of these animals is 300,000 head of beef cattle of various ages and grades and 5,000,000 head of lambs and mutton sheep. Since the average net meat weight of a beef animal is 515 pounds, of a lamb 37 pounds, and of a sheep 52 pounds, the stock grazed on national forests in the eleven far-western States produce annually about 155 million pounds of beef and 312 million pounds of mutton. In addition, it is said the wool grown totals 55,000,000 pounds, hides approximate 300,000 in number, and pelts 5,000,000.

* * *

The firm of Vitale & Rothery, forest engineers, of New York city, have been retained by the Canadian government to advise with the Canadian Conservation Commission in planning the survey of the crown lands in the province of New Brunswick for the purpose of estimating their timber resources, drafting appropriate conservation laws, etc. The work will probably be the largest timber estimate ever undertaken on scientific lines. Mr. Julian E. Rothery, of the above-named firm, and Mr. Clyde Leavitt, of Ottawa, a member of the Conservation Commission, are now studying the problem and traveling through New Brunswick. The survey and estimate must be completed before the end of 1918.

Messrs. Vitale & Rothery are also engaged in what is probably the largest timber estimate ever undertaken by private interests. They are surveying and estimating over 2,600 square miles of timber limits on the Lievre River in western Quebec for the James Maclaren Company, Limited, of Buckingham, P. Q.

* * *

The white marble of which the great $2,000,000 Lincoln memorial temple is to be built on the banks of the Potomac in Washington is to come from the Sopris national forest, Colorado. This is said to be the first great building in the East to be constructed of this stone, known to the building trades as Denver marble, though much of it has been used as an interior finish in public buildings. In the West a notable example of its use is found in the new Federal building at Denver. While the marble quarries are in the midst of the national forest, they are on private land secured under the laws by which areas bearing deposits of building stone are disposed of by the Government. Under the law prospectors can locate and secure title to mineral deposits on the national forests just as they can on the open public domain. The marble company which owns the quarries is a large user of national forest timber in the working of its properties, situated near Marble, Colo.

* * *

James B. Berry, formerly of the Forestry Department of Pennsylvania State College, is now at the University of Munich as an advanced student of forestry. He will receive his doctorate in March, 1915. He is also planning to take work on one or two of the experiment stations in addition to what he gets at Munich. J. Fred Baker, of the Michigan Agricultural College, is also at the University of Munich.

F. E. OLMSTEAD'S NEW FIELD OF WORK

FREDERICK E. OLMSTEAD, one of the best known consulting foresters, who has for some time been established in Boston, is now moving his office to the Pacific coast, where he will continue his professional work and give special attention to problems connected with fire prevention. Among other engagements of a similar nature he has been retained as forester by the Tamalpais Fire Association to organize and manage an intensive system of protection against fire in the forest and brush regions of Marin County, California. He will continue to give advice on forest policy, forest organization, and forest management, as applied to individuals, corporations, and associations owning or controlling forest lands.

KENTUCKY IS ORGANIZING

By J. E. Barton, *State Forester*

A MEETING of the Kentucky State Board of Forestry was held August 15, at which cooperative agreements between the State Board of Forestry and the United States Department of Agriculture under the Weeks law were approved. These were recently signed by the governor as chairman of the board, and it is expected that the cooperative agreements will be put into effect during the month of October. In the meantime, two district fire wardens have been appointed—Mr. H. F. Price, of Catlettsburg, in the eastern section of the State, and Mr. James T. Buford, of Frankfort, for the central portion of the State. Eventually there is contemplated having ten district fire wardens as well as fire wardens in each county in which there is considerable danger from fire. At the present the work of the fire protection of the State will be confined to the eastern and southern sections where there is the bulk of timber and where the danger from fire is the greatest.

COMING MEETINGS

Nov. 18.—Southern California Retail Lumber Dealers' Association, Los Angeles, Cal. Annual meeting.

Nov. 18-20.—Fifth National Conservation Congress, Washington, D. C.

Dec. 4-5.—National River & Harbors Congress, Washington, D. C. Annual meeting.

1914.

Jany. 19-20.—Retail Lumber Dealers' Association of Indiana, Indianapolis, Ind. Annual meeting.

Jany. 28-29.—Pennsylvania Lumbermen's Association, Philadelphia, Pa. Annual meeting.

Jany. 28-30.—Southwestern Lumbermen's Association, Kansas City, Mo. Annual meeting.

Jany. 30-31.—Retail Lumber Dealers' Association of the State of New York, Ten Eyck Hotel, Albany, N. Y. Annual meeting.

Feby. 3-5.—Chamber of Commerce of the United States, Washington, D. C. Second annual meeting.

Feby. 10-12.—Illinois Lumber & Builders' Supply Dealers' Association, Hotel La Salle, Chicago, Ill. Annual meeting.

April 30-May 9.—Forest Products Exposition, Coliseum, Chicago, Ill.

May 21-30.—Forest Products Exposition, Grand Central Palace, New York, N. Y.

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AMERICAN FORESTRY will print free of charge in this column advertisements of foresters wanting positions, or of persons having employment to offer foresters

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WANTED—By a practical forester, a position as forester and park superintendent under a City Park Commission, having charge of city trees. Address M., Care AMERICAN FORESTRY.

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A forest school graduate with experience in U. S. Forest Service and with lumber company, also possessing thorough business training, will consider offer of a good forestry position. Address M., Care AMERICAN FORESTRY.

Graduate of Penna. State College Forestry School, with experience in U. S. Forest Service and with a big paper company, desires position with tree surgery and landscape gardening firm. Address H., Care AMERICAN FORESTRY.

Forester with wide experience in nursery work, planting, fire protection, etc., and also in park work, desires position. Best of references. Address U, Care AMERICAN FORESTRY.

Graduated forester with one year's practical experience in U. S. Forest Service, desires to advance himself and will gladly communicate with persons desiring to employ a forester. Address D., Care AMERICAN FORESTRY.

Forester with seven years' experience, desires a position with a City Park Commission to take care of a city park and trees. Address T., Care AMERICAN FORESTRY.

WANTED—A position as City Forester by a forestry graduate with five years' practical experience in care of city and park trees; thoroughly familiar with the duties of a city forester; best of references furnished. Address, W. M., Care AMERICAN FORESTRY.

WANTED—By a Trained Forester and Landscape Architect, engagement with smaller city in charge of city trees and park work. Middle West preferred. Address, City Forestry, Care of AMERICAN FORESTRY.

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(Continued on next page.)

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Forestry quarterly, Sept. 1913.—A plan adequate to meet our needs for wood and timber, by B. E. Fernow, p. 307-22; White fir in the Klamath basin; a silvicultural study, by A. F. Kerr, p. 349-62; Insect destruction of fire-killed timber in the Black Hills of South Dakota, by P. L. Butterick, p. 363-71; The best brush-burning torch, by William T. Cox, p. 372-4; A method of obtaining main control in unsurveyed townships, by Wm. J. Paeth, p. 375-9; A short-cut method of cruising timber, by C. S. Judd, p. 380-2; Observations on the future sawmill, by Herbert J. Miles, p. 383-4; Shake-making and tray mills in California national forests, by Swift Berry, p. 388-92; Hobo's handy heater, by Henry H. Farquhar, p. 393-4; Value of physics and other fundamental subjects to students in forestry, by Hugh P. Baker, p. 395-8.

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PROGRAM OF THE

FORESTRY SECTION

OF THE

FIFTH NATIONAL CONSERVATION CONGRESS

MONDAY, NOVEMBER 17

Morning—

SESSION 1.

10 Call to order, etc.
10.15 Report of Sub-Committee on Publicity.
10.45 Discussion.
11.30 Report of Sub-Committee on Forest Planting.
12 Discussion.

Afternoon—

SESSION 2.

2 Report of Sub-Committee on State Forest Policy.
2.30 Discussion.
3.15 Report of Sub-Committee on Forest Taxation.
3.45 Discussion.
4.30 Appointment of committees, etc.

Evening—

SESSION 3.

8 Report of Sub-Committee on Forest Investigations.
8.30 Discussion (Talk by Raphael Zon, Chairman, illustrated by lantern slides).
8.50 Report of Sub-Committee on Forest School Education.
9.20 Discussion.
9.45 Talks and Discussions on Forest Insects, if desired.

TUESDAY, NOVEMBER 18

Morning—

SESSION 4.

9 Report of Sub-Committee on Lumbering.
9.30 Discussion.
10 Report of Sub-Committee on Forest Utilization.
10.30 Discussion.
11 Adjourn to attend opening session, General Congress.

Afternoon—

SESSION 5.

2.30 Report of Sub-Committee on Forest Fires.
3 Discussion.
3.30 Report of Sub-Committeee on Federal Forest Policy.
4 Discussion.

Evening—

SESSION 6.

8 Presentation of Resolutions, etc.
8.30 Discussion of Plans for Permanent Organization.
9.30 Adjourn to attend reception given by Mrs. Pinchot.

WEDNESDAY, NOVEMBER 19

Morning— 10 Water Power Session, General Congress.
Afternoon— 2 Forestry Session, General Congress.
Evening— 7.30 Forestry Banquet at Rauscher's.

THURSDAY, NOVEMBER 20

Morning— 10 Forestry Session, General Congress.

WELCOME, FORESTERS!

Forestry is the foremost topic of discussion at the Fifth National Conservation Congress, the delegates to which have now assembled at Washington, D. C., for what is the best attended and the most important Congress which has been held since the organization of that body.

That forestry should be given so much attention is a recognition of the fact that conservation of the forests is, next to conservation of human life, quite the most important subject attracting the attention of the people who are interested in the proper preservation and care of our natural resources.

There are today in Washington, foresters and lumbermen from all over the United States and Canada, men who have made a study of forestry and lumbering from both the theoretical and the practical side. They are attending the largest and most important gathering of forestry experts that the United States has ever seen. They are here to do practical work, to further the development of scientific lumbering, to extend the knowledge and the practice of all that is best in forestry, and, it is expected, to continue a campaign of investigation which was inaugurated a year ago, and has been most successfully conducted during the past twelve months.

This campaign carried on by the forestry committee appointed at the Fourth National Conservation Congress, and the ten sub-committees it selected, has resulted in eleven reports which are to be presented and discussed at sectional meetings of the foresters and the lumbermen during the Congress. These reports are upon the most important of forestry conditions, they have been prepared and compiled by experts, and their discussion at the Congress is expected to lead to the most telling forward step in forestry that has been made in many years.

The work of these sub-committees has been financed during the year by a fund raised through the endeavors of the American Forestry Association, and it is earnestly hoped—in fact, it is a prime necessity—that the work of investigation should be carried on from year to year.

Much has been done during the past twelve months, but there is a great deal yet to be accomplished.

The United States, foremost in most things, must become foremost in forestry. It has much to learn. It now is far behind many European countries in its appreciation of the value of forests and the need of proper protection of them, but the people are awakening to the immense importance of forest conservation, and, with committees of experts pointing the way, the best way, as a result of careful investigations of existing conditions, there is reason to hope that within a few years the forest policy of the Federal Government, of the State governments and of the municipalities will be so well advanced towards ultimate perfection that the United States will become one of the foremost forest-guarding and forest-growing countries of the world.

AMERICAN FORESTRY ASSOCIATION HEADQUARTERS

SPECIAL headquarters of the American Forestry Association, during the session of the National Conservation Congress, will be in Room 104, Mezzanine floor, of the New Willard Hotel.

There all visitors will be cordially welcomed, and there they will find all information regarding the Association's work that they may desire.

Copies of AMERICAN FORESTRY, issued especially for the Congress, may be had for the asking, and there also may be had the very valuable reports of the main and the sub-committees on forest investigations, printed in pamphlet form.

Visiting foresters, lumbermen or other men interested in forestry who may desire tickets for the banquet which is to be given the visiting foresters at 7:30 Wednesday evening, November 19, at Rauscher's, Connecticut avenue and L street, may secure them at the headquarters as long as the supply lasts. Tickets are $2.

Mr. Charles Lathrop Pack, president of the National Conservation Congress, will preside at the banquet, there will be a number of notable guests, and the five-minute addresses by leading foresters and lumbermen will give opportunity for a wide variety of subjects and much interesting discussion.

FORESTRY FOR THE FARMER.

The Orange Free State forestry department, British South Africa, is doing excellent work for the benefit of the farmer in producing young trees and in developing plantations and forests throughout the province, according to Consular Agent Arthur E. Fichardt, at Bloemfontein. The department has 2,825 acres planted in Bloemfontein, Thaha 'Nchu, Ladybrand, Ficksburg, Harrismith and Kroonstad districts, and upward of 10,250,000 trees have been planted. The Bloemfontein corporation has actively adopted a tree-planting campaign.

CHARLES LATHROP PACK, PRESIDENT OF THE FIFTH NATIONAL CONSERVATION CONGRESS

By Norman C. McLoud

THERE is curious coincidence of time, place and man in the fact that the Fifth National Conservation Congress meets in Washington this year and that Charles Lathrop Pack is its President. In point of timeliness the Fifth Congress comes at a period when so much has been accomplished along lines of Conservation that the enemies of the cause are exerting every energy in a vigorous attack on the principles involved. Geographically, Washington is the logical place for a Congress in that its deliberations and conclusions will attract all the greater attention at the hands of the ruling powers because the sessions are held at the seat of Government. From the viewpoint of personality, Mr. Pack's long and fruitful interest in constructive conservation renders him the ideal man for chief executive at a Congress held when so much is at stake.

Mr. Pack was a conservationist before the word was known. His interest in the future of the forests began when he was little more than a boy. As his vision broadened with ripening experience, he became more and more positive in his belief that the forests should be perpetuated in the interest of the entire nation, and that other natural resources should be similarly guarded. In his maturer years he has been a consistent and earnest student of rational methods of conservation and today he is recognized throughout the nation as one of the foremost exponents of the practice of protecting the country's resources for future generations without handicap to the present.

It was in 1878 that Mr. Pack made his beginning as a specialist in Conservation. His experience and training before that time had rendered him familiar with trees as trees and with forests as a basis for lumbering operations. In his boyhood he spent much of his time in the splendid white pine forests of Northern Michigan and in the woods about the Spanish River in Canada. As early as 1874, 1875 and 1876, he went into the woods with Tom Smith, a veteran of the forests, and it was under this old cruiser that he received his first instructions in estimating timber. Mr. Pack declares that one of the most vivid impressions of his youth had to do with the keenness and accuracy of Tom Smith's judgment as to quantity and quality, and he has always considered himself fortunate in having had this expert as his first instructor.

The year 1878 found Mr. Pack in the forests of Northern Bohemia and in the Black Forest. It was his good fortune at that time to have a letter of introduction to Herr Katz, who lived at Gernsbach, Baden. Herr Katz invited him to remain for some time at Gernsbach, and extended many social courtesies as well as giving him unlimited professional opportunities as a student. It was here that Mr. Pack had his first real vision of conservation. He says himself that theretofore he had looked upon the trees of the forest simply from the standpoint of their potential value in money. Now he began to see their value as a permanent resource.

Mr. Pack had learned at an early age to love the forest, and the happiest days of his youth had been spent in the woods. Because of this one may readily realize how much he enjoyed six months in the Black Forest. Later, he became acquainted with the forester of the town of Karlsbad in Bohemia and spent the larger part of one summer with him in the forest property belonging to the town of Karlsbad, sometimes visiting other nearby properties as well.

In 1882 he spent a good deal of time in the forests of the Southern States, particularly in Mississippi and Louisiana. It was in December, 1882, that he first discovered the fact that the long-leaf pine is only slightly injured by forest fires. Personally, he set fire to the forest floor in several different places in these States, and watched the result. Having been accustomed to see white pine seriously injured and killed by only a slight heat, his enthusiasm was intense when he noticed that the large, long-leafed pine remained almost uninjured even after a hot fire.

This discovery had an important bearing on Mr. Pack's career. Having convinced himself that the financial risk from loss by fire was relatively slight, he realized that the ownership of the long-leaf timber could not prove otherwise than profitable. Thus entrenched, he was able to induce a number of men to make investments in Southern timber. This was from 1882 to 1885, and Mr. Pack's efforts played an important part in the development of the Southern territory.

During this time Mr. Pack had his meeting with Jay Gould, then one of the most conspicuous figures in the railroad and financial world. The incident of this meeting and its results form one of the bright spots in Mr. Pack's memories of his early career. In those days the forestry expert, or forester, as he is known today, was altogether unheard of. In 1882, Mr. Pack went from Louisiana to New York for a short visit. In the Metropolis he saw General Hurlburt, an official of the Big Four Railroad. The Hurlburts and the Pack family were neighbors in Cleveland, Ohio, and the General had taken much interest in watching the young man's development. In New York he brought up the subject of forestry, and Mr. Pack felt greatly flattered that General Hurlburt should speak of him as a forestry expert. During the conversation the General suggested that he would like to have Mr. Pack meet Jay Gould. Mr. Pack declares that he shuddered at the thought. His youthful conception of the great magnate was such as to make him dread an encounter with a man who had been pictured as the essence of greed. Whether the young man feared that he would be kidnapped or eaten alive is not clear, but, at any rate, he confesses that he hid himself to prevent the meeting. His hiding was futile, however, for the next day General Hurlburt found him and announced that Mr. Gould wanted him to come to the Gould Mansion on Fifth Avenue. To refuse was impossible, as Mr. Gould had sent a man to the hotel for him and the man was waiting to convoy Mr. Pack into the dread presence.

The realization was not as bad as the anticipation, although Mr. Pack acknowledges that it was with profound awe that he found himself confronted by a stenographer who made a shorthand record of his two-hour conference with Mr. Gould. The stenographer took down every question propounded by the magnate and each answer given by his visitor. It was Mr. Pack's first experience

with having his words thus recorded, and he found it embarrassing. The story of this interview is perhaps best given in Mr. Pack's own words. He says: "Mr. Gould told me, among other things, that he wanted my judgment as to the relative value in certain locations in the South of hardwood timber lands and pine timber lands. He said he was thinking of purchasing from some Land Grant Railroads a considerable area, and he was uncertain whether to take lands best fitted for agriculture or to select hardwood timber lands or pine timber lands.

"I remember distinctly that he asked me a very shrewd question for those days, and that was as to the difference in the fire risk between hardwood and pine timber as it existed in Louisiana. I was able to tell him of my experiments with fire as affecting the long-leaf pine timber. I remember I told him that, in my judgment, the fire risk in owning long-leaf timber was less than 1% per annum.

"Before answering some of Mr. Gould's questions I very timidly told him that I had no capital, and that I could not afford to tell him even the little I knew about the forest and timber values and conditions without being paid for it. He said:

" 'Young man, I expect to pay you what will be entirely satisfactory to you, but I want you to be candid with me. Your information will be of value. General Hurlburt has told me that you know what you are talking about, and the compensation will be entirely satisfactory.'

"I remember that night at the Windsor Hotel I had visions and dreams of wealth. I was wondering how much I had better ask Mr. Gould to pay me and had gotten my ideas worked up to the sum of $200. The next morning when I went downstairs for breakfast I stopped at the office for my mail, and received an envelope containing a check for $1,000, with a short but kindly note from Mr. Gould.

"I am pleased to tell this anecdote, because of the many stories that have sometimes been told about Mr. Gould's 'sharp bargains.' He certainly treated me liberally. I think this is the first large fee ever received in this country for technical forest information."

One of Mr. Pack's first active steps in the cause of Conservation, or forest preservation, as they called it at that time, was taken in 1885. It was in that year that he made an exploration of the great Smoky Mountain region in North Carolina. Soon thereafter, he attended a scientific or economic convention held in Cleveland, and he retains vivid memories of a debate in which he became involved with a number of men of scientific education. In those days few people were ready to concede that a forest should be considered a crop. Mr. Pack put forward this theory and it was immediately contradicted. The scientists and economists gave fierce combat to this form or heresy. They were especially bitter in their denunciation of some of the lumbermen of Michigan for cutting white pine trees—known as cork pine—which were three or four hundred years old and which the speakers insisted were entitled to respect and protection because of their years and dignity. Mr. Pack took the position now universally accepted, that the trees had reached a point where they were deteriorating rapidly and that they should be cut in the interests of the forest itself. He argued that all ripe timber should be harvested and that it was the young trees that should be

protected and encouraged. More to his own surprise than to that of others, Mr. Pack found himself engaged in a heated argument on the floor of the Convention. Almost every delegate who spoke at all assailed the Pack theory as untenable and absurd. They voiced the sentiment of the time, which found its best expression in urging the woodman to "spare that tree, touch not a single bough." They could understand nothing that disagreed with this notion.

"That was about as far as the Conservation idea had progressed in those days," Mr. Pack relates. "These men were early conservationists, but they did not know what to do. They meant well but were still ignorant of the principles which men of the type of Gifford Pinchot have now caused to become so widely known and universally recognized."

Mr. Pack's early and persistent work and research along the line of Conservation rendered him especially equipped for the real Conservation movement which took concrete form with the holding of the famous conference of Governors at the White House in 1908. The part played by Mr. Pack in arranging that conference will probably never be fully known, but those who were behind the scenes realize that he was one of the most potent factors in the undertaking and its successful outcome. When the National Conservation Congress and the National Conservation Association were formed, Mr. Pack became active and influential in both. This activity and influence had their logical sequence in his election at Indianapolis last year to the office of President of the Fifth National Conservation Congress. His work in organizing and preparing for this year's sessions has met with the success that was inevitable. Mr. Pack has a rare faculty for constructive work and for inspiring his associates to energetic application to their share in an undertaking. This has been demonstrated throughout his successful business career, and now it finds apt corroboration in the vast amount of work that has been accomplished by the organization of the Fifth National Conservation Congress. This is especially true of the work of the Forestry Committee which will show results that will surprise the friends of the Forests. Without the energy, resourcefulness and enthusiasm of a man like President Pack, these results would have been impossible, and the Congress is under deep obligation for his work and direction.

SUMMER SCHOOL OF FORESTRY.

The New York State College of Forestry at Syracuse has received during the past year many inquiries as to a short course in Forestry.. Many young men who are thinking of taking up Forestry as a profession and wish to know more of it before entering college and many men who spend a large part of the year in shops and offices and want to learn more of the woods have by repeated inquiries sent to the College brought about the holding of four weeks of instruction in a Forest Camp to be carried on during the month of August, 1913, on Hoel Pond just north of Upper Saranac Lake.

REDUCING FOREST WASTE.

A new department in connection with the forestry branch of the Canadian Government has been established, which will undertake the work of investigating the possibilities of conserving Canadian forests by reducing waste in manufacture, by prolonging the life of forest products used in construction, and developing uses for products now wasted through the lack of knowledge as to how they may be employed. Hon W. J. Roche, Minister of the Interior, has appointed A. G. McIntyre, of Montreal, secretary of the Canadian Pulp and Paper Association, to take charge of the work.

THE FORESTRY COMMITTEE

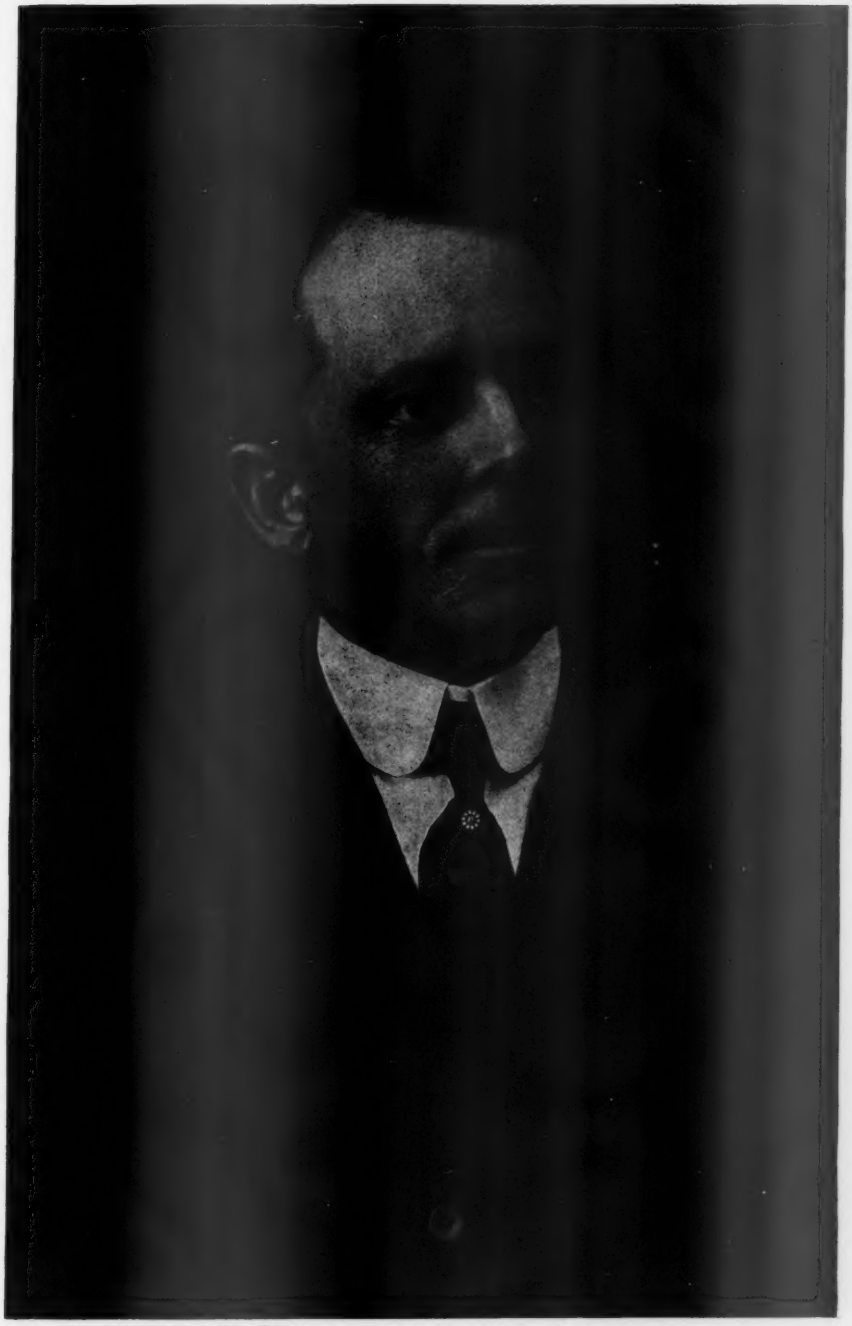
VALUABLE reports on forest publicity, the Federal forest policy, State forest policy, forest taxation, forest fires, lumbering, forest planting, forest utilization, forest school education and forest investigations, by committees of experts, which are ready for presentation and discussion at the Fifth National Conservation Congress, are all the outcome of the appointment, following the Fourth National Conservation Congress at Indianapolis last year, of the forestry committee.

This committee, consisting of Henry S. Graves, chief of the Forest Service, as chairman; E. T. Allen, secretary and forester of the Western Forestry and Conservation Association; J. B. White, a well-known lumberman of Kansas City, and former president of the Conservation Congress; W. R. Brown, of the Berlin Mills Co., of Berlin, N. H.; E. A. Sterling, a leading forest and timber engineer, and President Charles Lathrop Pack, of the Congress, ex-officio, has directed, during the year, the best organized and most important investigation of forestry subjects that has been conducted in many years. The result of this work is bound to have a marked effect on forestry development; the recommendations of the committees are progressive and practical, and will be of infinite value throughout the entire United States in helping to solve some of the most puzzling of the forestry problems.

The committee in making its report to the Congress, says:—

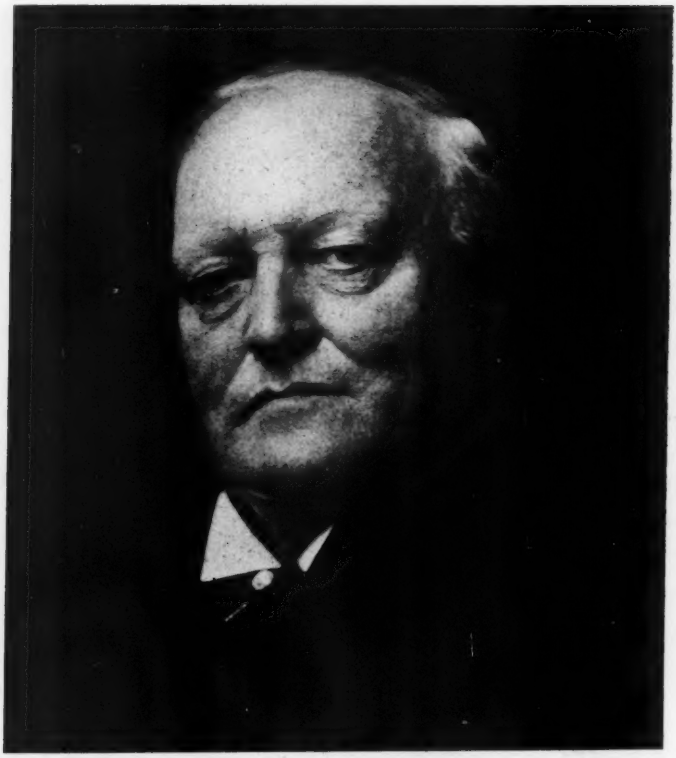
When the present Forestry Committee was appointed, following the meeting of the Fourth National Conservation Congress at Indianapolis in 1912, several of the public spirited men who had followed the developments took up the question of the most effective organization to represent the mutual forestry and lumbering interests involved. The desirability of such an organization was emphasized by the presence at Indianapolis of a number of men who were no longer in need of the general educational propaganda relative to the conservation of natural resources, but attended the Congress for the purpose of meeting progressive men in their own and related lines and securing specific information helpful in the solution of their own problems.

The need for a working organization and a rallying point, where mutual and more or less technical problems may be discussed, is felt particularly by the forestry and timber interests. The Conservation Congress was originally founded on forest conservation, and while the importance of other conservation subjects is realized the time seems to have come for specific forestry work at popular national meetings, in addition to the general publicity and education. It is merely a frank admission of the facts to say that the attendance and support of the forest conservation interests would have been lost to the Congress if it had not returned to the original theme; and not only this but the active workers in forestry desired an opportunity to exchange views on technical problems, so as to take home tangible information in return for their time and expense in attending.



HENRY S. GRAVES, CHIEF FORESTER, UNITED STATES FOREST SERVICE, WASHINGTON, D. C.

A Vice President of the American Forestry Association, Chairman of the Forestry Committee of the Fifth National Conservation Congress.



CAPT. J. B. WHITE, OF KANSAS CITY, MO.,

A well-known lumberman and conservationist, former president of the National Conservation Congress, a director of the American Forestry Association and a member of the Forestry Committee, and of the Sub-Committee on Lumbering, of the Fifth National Conservation Congress.

The Forestry Committee of the present Congress was organized with the view of meeting, to some extent at least, the conditions which existed. The Conservation Congress offered the first essential in the way of a recognized national organization, with which active forestry committee work could be associated. The second need was financial, and this was promptly met by the American Forestry Association, which provided the necessary funds. There then remained only the necessity of perfecting the proper organization of the forestry committee itself.

Various precedents have been established by older organizations for carrying on the character of work deemed most effective in this case. The plan which has given good results and is in general use is that of standing committees or sections assigned to various subjects. The American Railway Engineering Association and the International Congress of Applied Chemistry are good examples of this form of organization. The National Educational Association has carried the idea still farther, to the point of having various independent sections, each with

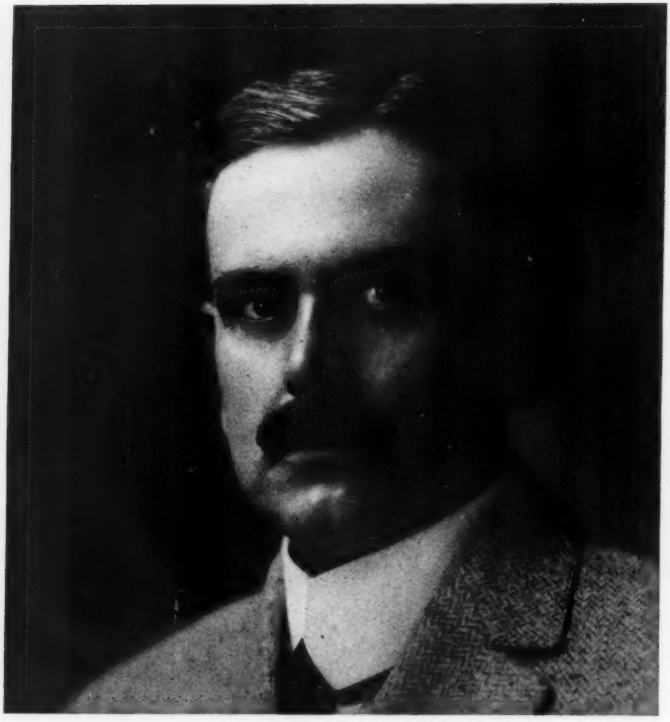
its own president and program. A central organization in each case holds the sections or standing committees together for the common cause. The needs of the Forestry Committee for this year seemed best met by the appointment of sub-committees to investigate and report on the more important forest conservation subjects.

As soon as this plan was decided upon ten sub-committees, with four to eight members each, were appointed. The subjects covered the more important technical problems of forestry and lumbering, and broad national questions involving legislation and regional public interests. The chairmen and sub-committee members were selected on the basis of their experience and ability to contribute new knowledge on the subjects assigned, or to compile the old in workable form. The list of committeemen is in itself sufficient evidence of the seriousness and high character of the investigations undertaken. Several topics were suggested under each sub-committee subject, and the more important selected for this year's report. Practically all details of text and arrangements were left to the sub-committeemen. It is striking evidence of the importance and public interest in forest conservation that fifty busy men should freely give their time and thought to work of this kind.

The printed reports, therefore, as presented to the Congress are not the views of rhetoric of any individual, but the mature conclusions of a body of experts, who represent all regions and all phases of forest activity. The necessary publicity to the sub-committee's findings will be given by printing and distributing the reports, by wide circulation through the AMERICAN FORESTRY MAGAZINE and lumber journals, and by distribution among trade, technical and public service organizations.

By presenting these reports at forestry section meetings and giving ample opportunity for discussion, further information will be gained and that available will be disseminated. Those who attend will receive the benefit of the information given, and, in turn, by taking part in the discussions, will contribute to the fund of available knowledge, and add facts for use in the present or future revision of the reports. Most of the subjects will continually develop new phases, and what is up to date or advanced thought or information to-day may be obsolete to-morrow. At the same time, there are fundamental principles which remain unchanged, and basic methods which when once applied need revision only in detail. No one has any thought of being able to settle at once and for good and for all the many complex conservation problems. Recognizing, however, the evolutionary nature of the development, it is apparent that the broader and better the knowledge and the closer the harmony among the various interests, the sooner will come security to the nation's timber resources and provisions for maintaining the needed supply.

It is not fitting for the Forestry Committee to pass judgment on its own work nor to outline plans for the future. It is a temporary body which will go out of office automatically at the close of the coming Congress; while as to results, the accomplishments of the year will speak for themselves in the sub-committee reports and in the forestry speeches before the general Congress. It may not be out of place, however, to say that the form of organization adopted is in general effective, and that the results are even better than was anticipated.



E. T. ALLEN, PORTLAND, OREGON.

Secretary and Forester of the Western Forestry and Conservation Association, a director of the American Forestry Association, a member of the Forestry Committee, Chairman of the Sub-Committee on Publicity, and member of the Sub-Committee on Forest Taxation, of the Fifth National Conservation Congress.

It is unfortunate that the present officers of the Conservation Congress, who have so consistently supported the work, and the Forestry Committee have a tenure of service so short that they can little more than inaugurate work of the kind which has been attempted.

From the standpoint of developing and establishing basic policies, and in perfecting and applying technical methods in the various fields of forest activity, an organization along the line of the present Forestry Committee is certainly needed and promises to be effective. At the same time, such work cannot be undertaken without a central national organization to lean on and funds to prosecute the work. Granting that a strong national organization is needed to carry on popular educational and publicity work, it would seem that the more specific and technical field could best be covered by a properly organized forestry committee, supported by and affiliated with the non-technical central organization.

Whatever the supporting organization and clearing house, it is certain that there exists a well-defined desire for an annual national forum of forestry and lumber interests, such as provided this year in connection with the National Con-

servation Congress, where views can be exchanged and problems of mutual interest worked out to practical conclusions. It would not necessarily be a large gathering, but essentially one of ways and means to accomplish many desirable things. The best basis for such a meeting would be a permanent organization for investigation and report, probably through standing committees which would be directed by a central body, either an administrative committee or the directors of the parent organization.

If specific mention was made of the individuals who have made possible a creditable showing this year, it would have to include every man on the Forestry Committee, every sub-committee chairman, and most of the sub-committee members. Mr. Charles Lathrop Pack, in his function as President of the Congress and outside of it, has given the strongest possible support to the Committee, and to him and to Col. W. R. Brown, Dr. Henry S. Drinker and Capt. J. B. White is due the credit for the financial arrangements, through the American Forestry Association, which made the work possible. For the large amount of valuable Pacific Coast data, and for cordial co-operation in all the work the Committee owes its thanks to Mr. E. T. Allen.

SYNOPSIS OF SUB-COMMITTEE REPORTS

The following is a brief summary of the work of the Forestry Committee, and its sub-committees, for the Fifth National Conservation Congress.

COMMITTEE 1

PUBLICITY

Chairman, E. T. Allen.....Forester, Western Forestry and Conservation Association, Portland, Ore.
T. B. Wyman.....Secretary, Northern Forest Protective Association, Munising, Mich.
F. W. Rane.....State Forester, Boston, Mass.
P. S. Ridsdale.....Secretary, American Forestry Association, Washington, D. C.
Overton W. Price....Vice-president, Treasurer, National Conservation Association, Washington, D. C.

TOPICS ASSIGNED

1. Publicity at the meetings of various popular and technical organizations.
2. Publicity of the forestry work of the Conservation Congress, both of the general congress and of the Forestry Committee.
3. Publicity through the press, looking particularly to the arousing of public interest in fire protection, taxation, and State forestry.
4. Publicity methods and devices useful to fire associations and other forest protective agencies.

The full report of this committee as printed, covers the four topics assigned. An introductory chapter presents in a new way the necessity for publicity since: "Public education is the chief measure of progress in forestry."

Some of the conclusions of the committee are that:

1. Progress in forestry depends more on what the public will permit than upon foresters and lumbermen. Consequently, public education is of primary importance.
2. Education is a matter of publicity and publicity is a trade in itself. It cannot be practised intuitively.
3. Since no one else has the interest or the requisite forestry knowledge, foresters and lumbermen must learn this trade.
4. It is not forests, but the *use* of forests, that we seek to perpetuate. Therefore, to be sound and convincing, educational publicity must include the lumber business. So long as the public believes forestry good and lumbering bad, there will be confusion and no real progress.

In addition to presenting a full report, the sub-committee assisted during the year in preparing the forestry program and arranging section meetings, and in giving publicity to the forestry features of the congress.

COMMITTEE 2.

FEDERAL FOREST POLICY

Chairman, Jos. N. Teal——Chairman, Oregon Conservation Commission, Portland, Ore.
Hon. A. F. Lever——Congressman, Lexington, S. C.
Robert P. Bass——Ex-Governor New Hampshire, Peterboro, N. H.
E. G. Griggs——President, St. Paul & Tacoma Lumber Co., Tacoma, Wash.
F. E. Olmsted——Consulting Forester, Boston, Mass.

TOPICS ASSIGNED

1. Needed legislation in national forestry.
2. National versus State control of national forests.
3. Economics of timber supply in relation to production and consumption.
4. Details of national forest administration.

The first three topics as above listed are covered by separate sections in the report. The subject is one of the broadest and most important before the country today, and is likely to become a matter of legislation which will vitally affect public interests. The whole report is a timely contribution to public knowledge on the subject.

Most of the criticism against the Forest Service concerns conditions beyond its control, which result from lack of authority or inadequate funds. The first

W. R. BROWN, OF BERLIN, N. H.

President of the New Hampshire Timberland Owners' Association, a director of the American Forestry Association, and a member of the Forestry Committee, and of the Sub-Committee on Lumbering, of the Fifth National Conservation Congress.

section on "Needed Legislation in National Forestry" outlines the needed changes and increases in Congressional legislation and appropriations which will enable the Forest Service to administer the National Forests with full efficiency. It is stated that "the legislation which is needed in national forestry is primarily to extend the principles already recognized by Congress and to enable the executive authority better to put these principles into practice."

Another attempt, to wrest the national forests from public control for private exploitation, is imminent, this time under the guise of arguments and legislation for State control. Section II of the Federal Forest Policy report, on "National versus State Control of National Forests," should dampen the powder of the States' rights advocates before they reach the firing line. The facts and evidence, stated by a man like Jos. N. Teal, who is, himself, a resident of a public lands State, are conclusive and irrefutable. One of the opening sentences summarizes the incentive at the bottom of the whole States' rights movement for control of the national forests as follows: "In reality knowledge of the

facts and consideration of the arguments used to substitute State for national control show that the underlying motive of the propaganda for State control has for its object the *elimination* of public forests, State or national. This fact should be known, and the issue accepted and fought out in the open instead from ambuscade."

Section III, on "Economics of Timber Supply in Relation to Production and Consumption," was written by Mr. E. T. Allen at the request of the sub-committee. It deals with the neglected topic of forest economics in a way which brings out many new and striking facts, particularly in relation to the sale of timber from national forests. As an indication of the character and soundness of this chapter the following is quoted: "It follows that the maximum cut from the national forests should be assured, *not during the existing period of stored and excessive virgin supply, or during the permanent future which will begin when adequate forest crops have had time to mature, but during the closing years of an intervening transition period.*"

COMMITTEE 3.

STATE FOREST POLICY

Chairman, W. T. Cox---------State Forester, St. Paul, Minn.
F. A. Elliott--------State Forester, Salem, Ore.
C. R. Pettis---------Superintendent, State Forests, Albany, N. Y.
H. H. Chapman-----Professor, Yale Forest School, New Haven, Conn.
J. E. Rhodes--------Secretary-Manager, National Lumber Manufacturers' Association, Chicago, Ill.

TOPICS ASSIGNED

1. Established principles in framing, passing and enforcing State forest laws.
2. Acquirement and management of State forest reserves, with special reference to cutover lands.
3. Co-operation between States, between the States and the Federal Government, and between States and private agencies.

The rapid development in State forest organizations, based on new and old legislation, and the important part each forested State must play in the administration of our forest resources, makes this one of the most important sub-committee subjects.

The report this year is largely confined to the first topic, "Established Principles in Framing, Passing and Enforcing State Forest Laws." The established principles are stated and discussed as a basic policy, followed by a model State forest law embodying these principles in more detail. Obviously any model or skeleton law must be modified materially to meet the conditions in various States and regions, but if there is a general understanding as to fundamental principles, adaptation to local conditions becomes comparatively simple.

Owing to the large amount of valuable detail submitted by the committee, and the great interest in State legislation, which will probably lead to many

suggestions and recommendations during the section meetings, it is possible that the report will be printed only in synopsis, and the revision for final printing made after consideration of the report at the section meetings.

COMMITTEE 4.

FOREST TAXATION

Chairman, Gifford Pinchot--President, National Conservation Association, Washington, D. C.
Acting Chm'n, E. T. Allen------Forester, Western Conservation Association, Portland, Ore.
F. R. Fairchild---Professor of Political Economy, Yale University, New Haven, Conn.
Dr. H. S. Drinker-President, Lehigh University, South Bethlehem, Pa.
E. M. Griffith----State Forester, Madison, Wis.

TOPICS ASSIGNED

1. Existing tax laws and their influence on forest management.
2. Basic principles of wise forest taxation, with definite suggestions for legislation.
3. Forest taxation in other countries.
4. Bibliography for students of forest taxation.

While several individual investigators have gone far into the subject of forest taxation, and a few of the States have passed progressive tax legislation, this is the first time a body of experts has undertaken a summarized compilation of existing knowledge, with working recommendations for forest tax legislation. The four topics listed are covered under separate chapters or sections in the report.

If there is any doubt anywhere existing as to the urgency and importance of reform in forest taxation it should be dissipated by reading the following introductory paragraphs in Section II: "Next perhaps to war, taxation is the most powerful instrument of government, capable, if unwisely used, of destroying individuals, communities and industries. Few government functions are less studied by the average citizen. Probably none of its branches is less understood than forest taxation. * * * It is everywhere recognized by foresters, tax experts and political economists that the general property tax applied to forests in the United States is unscientific and discouraging to conservative management."

Forest taxation has too long been considered purely academic and theoretical, whereas it really is a problem which vitally affects the capital invested in timber, the price of lumber to the consumer, and the prosperity of States. The report states that * * * "There are two distinct influences upon the rise of timber prices. One is a true rise of intrinsic value, due to diminution of supply and growth of consumption. This alone affords any basis of profitable investment. The other is the accumulation and compounding of carrying costs which, without investment profit, *must be continually added to the selling price to prevent actual loss* * * * The general property tax upon timber, then, has an alarming tendency to become excessive and it is exceedingly difficult to meet because it is

imposed annually while revenue with which to meet it is deferred. * * * From the community standpoint it threatens rapid wasteful cutting of mature timber, penalizes the growing of new timber, and for both these reasons hastens the cessation of all revenue from forest taxation and the consequent imposition of the entire burden upon other forms of property."

The basic principles of wise forest taxation are considered under the two separate heads of Taxing New Forest Crops and Taxing Mature Forests, and lead up to definite suggestions for legislation. The report is exhaustive in its treatment and specific in its recommendations, and could well be used as a working basis for legislative action in any State. In fact, there is now available for the first time, a compendium to which any State interested in the subject can turn for sound adoptable recommendations.

Owing to the pressure of other duties Mr. Gifford Pinchot was unable to direct the details involved in the compilation of the report, and Mr. E. T. Allen served as acting chairman.

COMMITTEE 5.

FOREST FIRES

Chairman, C. S. Chapman------Secretary-Manager, Oregon Forest Fire Association, Portland, Ore.
D. P. Simons-------Manager, Sound Timber Company, Seattle, Wash.
F. H. Billard---------Forester, Berlin Mills Company, Berlin Mills, N. H.
J. S. Holmes---------State Forester, Chapel Hill, N. C.
Coert DuBois-------District Forester, Forest Service, San Francisco, Calif.

TOPICS ASSIGNED

1. Fire prevention by States, by the Federal Government, and by private interests.
2. Forest fire association work, with special reference to the possibility of co-operation and standard practice between the various protective associations.
3. Forest fire insurance.

One of the most hopeful developments of recent years is in the line of forest fire prevention, hence the work of this sub-committee is of prime importance, since without fire protection there can be no forestry. The report covers fully the first topic in fire prevention by States, by the Federal Government, and by private interests. The general situation, including the definite results from systematic fire prevention by private associations and other organizations, comprise the main body of the report. This is followed by a detailed discussion of the fire protection work being done in various States.

"No phase of forest work has been so actively taken up or made such marked progress as that of forest fire prevention during the past ten years.

E. A. STERLING, OF PHILADELPHIA, PA.

A forest and lumber engineer, director of the American Forestry Association, and Secretary of the Forestry Committee, of the Fifth National Conservation Congress.

"During the past five years there has been an increase of *over 3,000 per cent* in the area of privately owned forest land patrolled against fire; while in addition to this, 92,000,000 acres of private land has been systematically looked after and an area of some 187,000,000 acres of timber land patrolled by the Forest Service.

"Forest fires in the United States, according to the most conservative estimates since any records were available, have caused an average annual loss of 70 human lives and the destruction of merchantable timber to the amount of $25,000,000.00."

COMMITTEE 6.

LUMBERING

Chairman, R. C. Bryant.....Professor of Lumbering, Yale University, New Haven, Conn.
G. M. Cornwall.....Editor, *The Timberman,* Portland, Ore.

J. B. White_____Lumberman, Kansas City, Mo.
J. F. Clark_____Forest Engineer, Vancouver, B. C.
F. A. Silcox_____District Forester, Missoula, Mont.
Adam Trieschmann__Crossett Lumber Company, Crossett, Ark.
C. S. Martin_____Saginaw Timber Company, Aberdeen, Wash.
W. R. Brown_____Berlin Mills Company, Berlin, N. H.

TOPICS ASSIGNED

1. The basis of lumber costs and stumpage values.
2. The application of scientific management to lumbering operations.
3. Reports on log and lumber measures, with recommendations for standard scales.
4. Forest engineering.

The report for this year is confined mainly to the second topic listed. An appendix is submitted in the form of an excellent preliminary report on "Efficiency in the Logging Industry in the Pacific Northwest," by C. S. Martin.

This is a committee representing particularly the manufacturing end of the lumber business, and since many widely diversified problems are involved the chairman calls attention to the fact that a complete report could not be prepared in one season. Although the committee was composed largely of lumbermen and dealt exclusively with lumbering questions, little co-operation or assistance was received from those who should be most interested. Apropos of this situation is Dr. C. A. Schenk's truism that "the new turn in lumbering methods cannot be brought about from the outside. It will be necessary for the rejuvenation of lumbering, for the forester to become full fledged lumbermen." If outside help will not be accepted, and less than 5 per cent of the insiders in the lumbering business who were asked for information show any interest, how can anything be worked out? After all, the theorist, considered as "a man who tries to think what he is doing" is usually the one who worked out the reforms ultimately welcomed by the "practical" man who is too busy to help.

There is a very large field for profitable investigations under the several topics named, but to carry on the work satisfactorily the co-operation and assistance of the lumbermen is a first essential. Moreover, funds should be available for the employment of a competent field man to study and compare conditions and methods and personally obtain information from operators. The various phases of forest utilization could properly be handled under the same subject heading.

COMMITTEE 7.

FOREST PLANTING

Chairman, E. H. Clapp_____Forest Service, Washington, D. C.
Acting Chm'n, S. N. Spring____Professor, Forestry Department, Cornell University, Ithaca, N. Y.
T. T. Munger____Forest Service, Portland, Ore.
S. B. Detwiler____Superintendent, Chestnut Blight Commission, Philadelphia, Pa.

TOPICS ASSIGNED

1. Conditions under which commercial planting is desirable.
2. Nursery methods.
3. Field planting methods.
4. Natural versus artificial regeneration.

While a large amount of forest planting has been done, much of it might be classified as sporadic or experimental. In most planting operations too little attention has been paid to the purely commercial aspects of the question.

The sub-committee's report deals entirely with the commercial conditions under which planting is advisable. It summarizes both for technical and regional conditions, and for various classes of owners. The startling statement is made, and substantiated by figures, that $65,000,000 is lost annually through allowing denuded and potential forest lands to remain unproductive. The urgent need of a definite financial plan for the acquirement and reforestation of denuded lands by the Federal and State Governments, and for assistance to private owners, is pointed out. Several plans covering these points are outlined.

To the main report is added an appendix, which treats in detail of the commercial conditions under which planting is commercially feasible in various regions.

Owing to the absence of Mr. E. H. Clapp on official duty in the West, Prof. S. N. Spring, of Cornell University, served as acting chairman and prepared the main body of the report.

COMMITTEE 8.

FOREST UTILIZATION

Chairman, R. S. Kellogg——Secretary, Northern Hemlock and Hardwood Association, Wausau, Wis.
Bruce Odell——Cummer-Diggins Company, Cadillac, Mich.
W. C. Miles——Manager, West Coast Lumber Manufacturers' Association, Tacoma, Wash.
E. A. Ziegler——Professor, Mt. Alto Forest Academy, Mt. Alto, Pa.

TOPICS ASSIGNED

1. Closer utilization in logging.
2. Closer utilization in manufacturing.
3. Closer utilization in marketing.
4. The preservative treatment of timber.

This subject, in common with lumbering, properly requires field study by a paid man in order to procure and compile satisfactory data, and the two lines of investigations could be combined.

The report of the sub-committee for this year describes clearly the economic limitations to the closer utilization of timber, and to some extent touches on the unapplied possibilities in the line of utilization. The actual developments are contingent on commercial conditions and also influenced to some extent by lack

of information. Apropos of the latter, the synopsis of the report states that "The lumber industry needs more information than is yet available upon the merchantable products than can be obtained from trees of various kinds and sizes. Further investigations should be made of the costs of manufacturing many by-products, and of the conditions under which such operations are successful. The effect of unrestrained competition in timber exploitation upon our forest resources should receive serious study."

The portion of the report dealing with the conditions which prevent closer utilization is in effect a reply to the unjust popular opinion that the lumberman is responsible, either deliberately or otherwise, for the wastage of 50 per cent to 75 per cent of timber which he handles. It is pointed out that the conditions which make possible closer utilization in logging and manufacturing are: (1) Ready markets; (2) Cheap transportation; (3) Character of timber; (4) Efficient management; (5) Proper equipment. The last two are reforms which are usually within the power of the lumberman to correct, but the first three and many other conditions are due to influences entirely beyond his control.

This report should give the laymen and general public a much clearer conception of the difficulties in the way of complete, or even close, utilization of timber.

COMMITTEE 9

FOREST SCHOOL EDUCATION

Chairman, J. W. Toumey------Director, Yale Forest School, New Haven, Conn.
Walter Mulford-----Professor, Forestry Department, Cornell University, Ithaca, N. Y.
C. H. Shattuck------Professor of Forestry, University of Idaho, Moscow, Idaho.
George S. Long-----President, Washington Forest Fire Association, Tacoma, Wash.
W. B. Greeley------Assistant Forester, Forest Service, Washington, D. C.

TOPICS ASSIGNED

1. Forest school education; its strength and weakness.
2. Courses or methods of teaching needed to better fit men for practical work in lumbering.
3. Secondary forest school education.
4. Function of schools in technical investigations.

Within recent years the question of technical forestry education has been thoroughly discussed at conferences called for the purpose, hence the report of the sub-committee on the general subject is confined this year to the third topic: "Secondary Forest School Education."

The need for a body of trained rangers and woodsmen has been felt ever since forestry became a national necessity, and the report deals in considerable detail with the question of the school courses, and form of training best suited to prepare men for this class of work. The teaching of forestry in public schools,

and short courses in forestry for farmers and agricultural students, are also discussed.

COMMITTEE 10.

FOREST INVESTIGATIONS

Chairman, Raphael Zon.....Forest, Service, Washington, D. C.
F. B. Laney.....Geological Survey, Washington, D. C.
Walter Mulford.....Professor, Forestry Department, Cornell University, Ithaca, N. Y.
C. G. Bates.....United States Forest Service, Denver, Colo.
A. G. McAdie.....Director, District Weather Bureau, San Francisco, Calif.

TOPICS ASSIGNED

1. Subjects demanding investigation.
2. Responsibility for investigative work; correlation and avoiding duplication.

The report deals fully with the relation of forests and water, and while in part a compilation of established facts and theories, contains some new and interesting matter. The new feature concerns the effect of forests in broad continental valleys upon precipitation over continents. If this new theory is correct, as it seems to be, it provides even a greater justification for forest conservation than the accepted view of the relation of forests to stream flow. This theory has been discussed more specifically in an article entitled "The Relation of Forests in the Atlantic Plain to the Humidity of the Central States and Prairie Region," by the chairman, Mr. Raphael Zon, in *Science,* under date of July 18, 1913.

From the summary we learn that "the facts brought out in this report clearly show that there is an intimate relation between the forests, the climate, and the regularity of the flow of water in the streams.

"There are no accurate means of determining the extent of forest land necessary for the regulation of stream flow and the protection of the soil against erosion. *From the study of conditions, however, existing in other countries, it may be inferred that, in order not to disturb the natural balance, the proportion of forest land to other kinds of land must be not less than one-fifth of the total area of the country.*"

In the open yellow-pine forests of Washington and Oregon a collapsible plow is being used in digging fire lines to stop surface fires. The plow can be dismantled and folded into a compact form, so that it can be packed on horseback, and weighs only forty pounds. When in use, one man with a horse can do the work of twenty or more men working with shovels.

Under forest regulations in Colombia, rubber gatherers are required to give the trees a rest period in tapping them for gum. The size, number, and location of the incisions are regulated by law.—In the United States similar regulations are in force in the tapping of pines for turpentine on the Florida national forest.

Oils distilled from the needles of spruce and fir trees are being used to scent petroleum floor oils which are sometimes objectionable on account of their odor.

THE REPORT ON LUMBERING

LUMBERMEN have been interested to some extent in the discussions regarding scientific management which have occupied a prominent place in the public mind during the last few years. Some have employed efficiency engineers to inaugurate systems based on the general principles applied in railroad shops and in certain manufacturing establishments, but as a whole the results have not proven altogether satisfactory, although in some instances individual parts of the operation, such as methods of handling labor, the conduct of the shipping department, etc., have been improved.

The committee on lumbering which is reporting to the Conservation Congress, comprises R. C. Bryant, professor of Lumbering at Yale College, the chairman; Geo. M. Cornwall, editor of *The Timberman,* of Portland, Ore.; J. B. White, of Kansas City, a well-known lumberman and former president of the National Conservation Congress, and a director of the American Forestry Association; J. F. Clark, a forest engineer of Vancouver, B. C.; F. A. Silcox, United States District Forester, of Missoula, Mont.; Adam Trieschmann, of the Crossett Lumber Co., of Crossett, Ark.; C. S. Martin, of the Saginaw Timber Co., Aberdeen, Wash., and W. R. Brown, of the Berlin Mills Co., of Berlin, N. H.

The work outlined for the committee by the chairman of the forestry committee was as follows:

1. The basis of lumber costs and stumpage values.
2. The application of scientific management to lumbering operations.
3. Report on log and lumber measures, with recommendations for standard scales.
4. Forest engineering.

The importance of the subjects allotted to the sub-committee and the limited time available for securing and compiling data precluded the preparation of a detailed report. The energy of the committee was devoted chiefly to one subject, namely, "the application of scientific management to lumbering operations." Suggestions for future work also have been presented.

The most satisfactory changes leading to greater efficiency in the lumber industry the committee finds have resulted from plans and suggestions made by men actively engaged in logging and manufacturing work. In most cases the improved methods have been applied to individual parts rather than to the whole operation. There are at present two associations, namely, the Pacific Coast Logging Congress and the Southern Logging Association, which have done much and which promise greater results in the future, in increasing efficiency in the logging industry. Their annual meetings have brought about a closer relationship between the various logging superintendents both in a business and social way, and have led to the discussion and wide dissemination of the more approved methods of operation.

One of the weaker points in the present conduct of logging operations is the lack of sufficient data on the "logging chance," previous to the commence-

PROF. R. C. BRYANT, NEW HAVEN, CONN.

Professor of Lumbering, Yale University, Chairman, Sub-Committee on Lumbering, of the Fifth National Conservation Congress.

ment of operations. While marked advances have been made in this respect in some regions, especially in the Northwest, there still is room for improvement on many operations. The data required comprises more accurate information regarding the stand of timber, both as to species, amount, quality and location with reference to topography and to markets; topographic maps showing the main streams, and other features, which are a valuable aid in determining, in advance, the general location of the chief lines of transportation for the timber; a report on the general logging conditions on the tract, with special reference to the best methods to pursue, the season of the year in which logging can be conducted to best advantage, etc., and the preparaton of a budget covering a period of six months or a year, in which is to be shown the funds required for operation, the number of laborers and animals required, the quality of supplies needed, and like items, such budget enabling the management to anticipate closely its needs and the definite time and place laborers, animals and supplies will be required.

A budget when carefully prepared reduces loose plans and crude guesses to a scientific basis and to a large extent eliminates the element of chance.

Another point requiring close consideration is the collection and compilation of costs of operation. The accounting methods in use by lumbermen must necessarily vary in details because of the difference in the character of management and the lack of uniformity in operations. The fundamental principles on which all accounting methods should be based are identical and there is need of the preparation and adoption of cost-keeping systems based on these principles. The

ADAM TRIESCHMANN.

Crossett Lumber Co., Crossett, Ark., member of the Sub-Committee on Lumbering, of the Fifth National Conservation Congress.

GEORGE M. CORNWALL.

Editor, the *Lumberman*, Portland, Ore., member of the Sub-Committee on Lumbering, of the Fifth National Conservation Congress.

accounting methods employed by many are faulty in numerous ways and unless the costs are kept in accordance with sound principles it is not possible for the operator to know whether his business is profitable as compared to that of his competitors.

In connection with accounting methods, a very desirable feature is the compilation and comparison of the experience and data gained during the preceding years. This data, if properly presented, forms the basis for improved methods of operation, greater efficiency, and increased profits since the operator is enabled to avoid past mistakes and from the experience gained can increase the efficiency of management. While most operators give some consideration to this subject, there are few who systematically prepare such data and give it careful consideration. The more glaring mistakes of the past are usually apparent without special study and these receive attention, but the minor losses often escape notice. It is the sum total of the smaller and less apparent defects that in the end often determine whether the balance sheet shows a profit or a loss.

Labor, the cost of which comprises one of the heaviest expenses in logging

and lumber manufacture, is now receiving more consideration than at any previous time. As a rule, good, comfortable quarters are provided for the loggers and excellent board is furnished. In every region there is need of greater attention to hygienic and sanitary measures, although specific operations in every region leave little to be desired.

The problem of proper sanitation in the camps of the Northeast is not so vital since work is conducted chiefly throughout the fall and winter, the natural water supply is excellent and camp drainage good. The region has in the main been free from epidemics caused by unsanitary surroundings.

In the South and Northwest where logging is carried on throughout the year the problem is more serious; in the South especially where many camps contain the families of the workmen, the inauguration and enforcement of proper hygienic and sanitary measures is an essential. The problem is difficult because of the ignorance and hostility of the workmen and their families to the enforcement of the necessary regulations. More careful thought should be given to the camp location, water supply, refuse disposal, barn sites, etc., in order to protect the laborers from their own ignorance.

In the West where families are not as common in camps as they are in the South, the enforcement of regulations is not so difficult, but fully as important.

An interesting development in handling labor in the lumber industry is the growth of the idea of rewarding laborers for efficient work. This has been developed largely in logging operations in the Northwest, although it is not uncommon in some parts of the South. The plans in force are usually the payment of a bonus for all work performed above a certain agreed upon "base," or payment on the "piece work" basis. The manner in which these systems are applied differs with the various companies and in some cases they are applied to the entire force, in other cases only to a limited number of workmen, chiefly foremen.

The results in nearly every instance have given satisfaction both to employer and employee, and have not only increased the daily output, at a reduced operating cost, but have also raised the average wage of the employees, created a greater satisfaction among them and have done much to create and foster a friendly spirit among employers and employees. Where the reward system has been introduced very little difficulty has been experienced from labor organizations.

Another line of effort which is coming into prominence in the lumber industry is the promotion of Social Welfare Work. This aims to increase the comfort and well-being of the laborer, by providing pleasant surroundings for both himself and family; by furnishing reading rooms, club houses or similar places where harmless amusements, entertainments and like pastimes may be enjoyed; by the provision of good school and church facilities, and by demanding that employees shall take the proper stand on moral and social questions. The efforts of this character made by lumbermen have been greatly appreciated both by woods and sawmill employees and have raised the general quality of labor available.

Some companies have cooperated with their employees to the extent of forming investment companies in which their workmen may take stock on easy terms. These companies are able to secure safe investments which return good rates of

interest and in every case the scheme has proved a potent factor in the creation of a more friendly relation between the company and its crews.

There is need for more careful attention in felling and log-making work, in order to reduce the loss of timber from high stumps, breakage, cutting for quantity rather than quality, waste in cutting logs too long or too short, and waste in the top. The method of paying fallers and log-makers on a contract basis is a drawback to efficient work since the aim of each workman is output, rather than quality of work performed. Closer supervision, and payment by the day, with some reward for efficient work, are believed to be essential to securing the best results.

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The standardization of logging methods for given conditions would be a marked step in advance in efficiency. In every region there are numerous methods in use for performing work under similar conditions. Some of these methods are more efficient than others. Formerly the knowledge gained by experience was not disseminated throughout the region, for until recent years logging superintendents have not had organization meetings where problems could be discussed. The average woods superintendent in the past has usually acquired his knowledge in the vicinity of the place where he is employed and in many cases has acquired his experience with his present employers. His knowledge of other methods for performing work similar to his own is often meager. The collection of data in regard to the various methods and their standardization offers an important field of work for loggers associations or for other bodies interested in forest work.

In making recommendations for future work the committee believes that an

important field of investigation and one which would be of great value to the lumber industry, comprises the collection, compilation and publication of facts in regard to "The Basis of Lumber Costs and Values."

This subject is a broad one and includes almost every phase of forest work. Lumbering, although one of the first industries to be started in this country and today ranking as one of the most important, is still undergoing a process of development and we are now in a period in which there are taking place more important changes in methods and utilization than at any time in its history. We are also on the threshold of State and National legislation looking toward the conservation of our forest resources.

Just laws for the regulation of the lumber industry or any industry interested in the exploitation of natural resources cannot be made without a careful survey of the raw material available; the relation of the industry to the development and well-being of the country; the methods by which the industry is conducted; markets and market conditions, etc.

There is not in existence today, except in fragmentary form, a clear, concise and impartial treatise dealing with the lumber industry, to which lawmakers may turn for reliable data on which to base legislation; to which judges and other court officials may turn for information in litigation affecting forest interests; and to which such national bodies as the Interstate Commerce Commission can turn for impartial information regarding the transportation problems that affect the industry.

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It is proposed that a document of the above character be prepared by regions, each of which would include the territory in which the markets and market conditions, and the logging and manufacturing conditions were similar.

The preparation of the report for all regions would be a work of several years and would require a considerable sum of money, but it is believed that the educational value to the public of a report of this kind would well repay the time and money expended in its preparation.

The so-called Scotch pine is the principal tree in the Prussian forests...Its wood is much like that of the western yellow pine of the United States.

The average area administered by a ranger on the Federal forests of the United States is about 100,000 *acres. In Germany the area administered by a man of equivalent rank is about* 700 *acres.*

A LOSS OF $65,000,000 A YEAR

SIXTY-FIVE million dollars a year are lost because denuded forest lands in the United States remain unproductive.

Forty million acres of our natural forest lands are now denuded and incapable of being regenerated naturally.

These are statements made by the sub-committee on forest planting whose report is made to the Fifth National Conservation Congress. The figures are startling. What may future generations, facing a timber famine, think of a national, and of State governments, so near sighted as not to recognize the timber needs of the future and to provide for them.

The committee shows how by an expenditure of $1,000,000 a year for the next ten years, to 1924; by spending $2,000,000 yearly during the following decade, to 1934; $4,000,000 a year for the decade ending in 1944; $6,000,000 yearly for the next ten years and finally $8,000,000 yearly for the decade ending in 1964, or a total of $210,000,000 in all, in fifty years it would be possible to replant twenty million acres, which would eventually yield at least six billion board feet per year.

Half of the total expenditure would be borne by the Federal Government and the other half by the States.

The report is voluminous, and not only treats as a whole the conditions under which commercial planting is desirable but in carefully worked out detail discusses these conditions as applied to various sections of the country.

The committee, of which E. H. Clapp, of the Forest Service, is Chairman, comprises in addition, T. T. Munger, of Portland, Ore., Prof. S. N. Spring, of the Cornell University Department of Forestry, and S. B. Detwiler, of Philadelphia.

Declaring that an investment in planting offers less incentive to private owners, as the money necessary for it must be invested for from 50 to 100 years, the committee states that such a long-time investment is most feasible for the States and the Federal Government, and also under proper conditions for long-lived corporations and communities.

Discussing the planting conditions in detail, the committee says that the danger from forest fires, which for some years was regarded as sufficient to render an investment in planting wholly impracticable, has been greatly exaggerated. Effective fire protection and organized work in fire fighting has minimized the fire damage to a small percentage of loss, as indicated by reports from Connecticut, which show that in the last twelve years less then 1% of the total planted area was destroyed, and this in a thickly settled region where the causes of fire are numerous.

Danger of losses due to insects, fungi and other injurious agents are not great enough to render an investment in forest planting unsafe.

As to taxation of planted forest lands it is apparent that legislatures are steadily awakening to a realization of the injustice arising from repeated taxa-

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tion of the forest crop and are rapidly being led to favor a taxation which will encourage forest planting. Emphasis is laid upon the necessity of a careful study of regional factors, such as climatic conditions, temperature and rainfall, to determine at the outset the advisability or inadvisability of planting. There should also be considered the value of an accessible market and the reasonable certainty of a steady future demand, and the choice of species for planting which must meet market requirements, in addition to being suitable for the sites on which they are to be set.

A more important consideration is the initial cost. The average price for natural forest land without timber is stated as being about $10 an acre, while the cost of trees has been brought within reasonable limits by the development of State nurseries and the establishment of private nursery companies. It is not difficult to plant successfully at a low figure and the general cost in Eastern forest planting may roughly be estimated at one cent for each tree set out, or on a 6′ x 6′ spacing, approximately $12 an acre. Planting on quite a large scale may be done at a much lower figure.

Federal forest planting in national forests has varied widely in cost, according to the conditions under which it has had to be done. Its purpose is more than commercial production, since much of the work includes water conservation by forest planting. In large operations on accessible sites presenting no unusual difficulties, the cost per acre is about the same as in planting expense in Eastern forest regions.

As to the returns, a high rate must not be expected. It is generally reckoned

at 4% to 6% on the investment, with a small net profit per acre. Further than this, in the great majority of cases, the return does not come within a short period of years. Eucalyptus, which has a limited planting range, will be marketable in one to two decades. Fence post species yield a crop within 15 to 25 years at a considerable profit, while the shortest period for timber production in general is 35 to 40 years, and for large timber 60 to 100 years.

By this it is seen that as a business venture forest planting does not hold the position which short-time business investments do. It rarely appeals to the private land owner from this standpoint. Such an investment does, however, assume an important position when it directly affects capital already invested, or properties which are to be held perpetually for timber production. Planting by private individuals of quick growing species suitable for domestic purposes is feasible in many cases. In windswept regions the protective influence of a shelter belt brings high money returns in increased crops on land adjoining the forest. Commercial planting by individuals is also to be desired in farming regions that are treeless or in woodlot regions where wood is scarce through continual cutting and the prices of needful farm materials have become high.

There is a class of corporations holding large acreages of forest land. Their problem is how to make certain the annual cut to supply their mills perpetually. The paper and pulp companies in the spruce regions of the Northeast exemplify this class. Their problem is one of forest organization. Naturally regeneration will most properly be given first consideration by the employment of silvicultural methods, forest planting will supplement natural reproduction and may also be applied to waste, cutover lands and burnt areas to bring them into productivity. Forest planting becomes simply a rational part of forest management by the corporation. There is every incentive for such corporations to utilize planting where it is practicable and such expenditures are an increase of capital to develop property. Here the long-time nature of the investment is not an obstacle. 15% to 20% of our annual timber consumption is railroad materials. Hence the future supply is essentially important to every railroad corporation. If a railroad owns forest land, planting the forest naturally takes its usual place in the organization and management of the company's forest; but if a railroad traverses a treeless prairie or plains region such as the Middle West, a policy for planting trees for tie production in that region would not be fundamentally sound and experiments already tried do not seem to warrant further attempts.

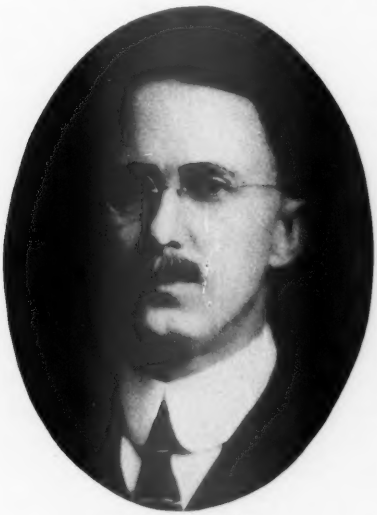
With coal companies owning forest land experimental planting may be desirable or it may be determined that the regional supply of timber will be sufficient.

Feasibility of planting by water companies is apparent. Large areas have to be owned to protect the purity of supply, and such lands offer the best protection if forested. It is not only protection but a most satisfactory crop for water companies, considering their purpose, and an excellent future profit is assured owing to nearness of market in nearly every instance. What is said in reference to private companies furnishing water supply for cities and towns applies to the feasibility of planting for cities and towns which own and manage their own water systems, if the areas owned are sufficiently large to yield ultimately a high money return to the community. Once established, such forests

will furnish regular crops of timber which can be used for city purposes or sold. In either case taxation will be reduced or the water rate can be lowered to a minimum figure.

The committee strongly urges the advisability of States entering upon an extensive plan of commercial forest planting. The State has the power to appropriate funds for such work, which is comparable with other public work such as road building, swamp drainage and irrigation. Non-agricultural lands now denuded must be made productive to meet future demands.

It is estimated that 7½ million acres of denuded forest lands in the national



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forests require reforestation. The government policy places planting for watershed protection first and commercial planting on the lands which produce heavy stands of quick growing species second. Under present plans 30,000 acres are to be reforested annually. There should be no lowering of the present standard of annual planting or the amount of funds available for this purpose each year. Increase in the national forest planting budget should be made as fast as experimental work indicates satisfactory methods. It is conservatively estimated that there are sixty-five million acres of denuded lands in the United States in need of planting, including that in national forest regions and in treeless regions.

Unless reforestation on a large scale is entered upon there will be but little diminution in this area of denuded land in a hundred years. Each year's delay in making the investment means a money loss represented by the growth planted forest could be making on this immense area. At an estimated return of only $1.00 per acre per year, this annual wood growth amounts to a yearly loss of 65

million dollars to the nation. Within fifty years our virgin timber will be gone and much of our second growth. To meet future needs of timber denuded lands must be brought into productiveness. Reforestation on a large scale is absolutely essential to the Nation's welfare. Both Federal and State action is necessary to place reforestation on an adequate scale. Federal aid should apply to States within natural forest regions having denuded and waste lands. Planting within prairie and plains regions serves almost wholly to benefit the individual owner through furnishing domestic supply of farm materials and by protection to the owner's crops.

The Federal Government has adopted a definite policy in forest conservation by the creation, administration and management of the national forests created from public lands and more recently acquired in the East by purchase under the Weeks law. It has further provided for protection of streamflow and thereby incidentally for future timber supplies by financial aid to the States in protecting forests on important watersheds from destruction by fire.

The acquisition of waste lands by the Federal Government for national forests should be greatly extended and the present restriction limiting the acquisition of such lands to the watersheds of navigable streams removed, on the broad basis of the public need for greatly increased wood production for the future, regardless of State lines.

The acquisition of similar lands by States should also be greatly extended.

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Financial arrangements should be made under which States could secure the credit of the Federal Government for the purchase and reforestation of State lands, under proper Federal control.

Federal aid in planting privately owned lands in cooperation with the States requiring it should also be extended under a plan similar to that now in effect for fire protection under the Weeks law, namely, that the States appropriate an equal sum. Expenditures should be restricted to the planting of non-agricultural lands which have been classified by competent authorities. Before aid is extended a contract should be required of owners guaranteeing a conservative plan of management to be approved by Federal or State officers, and giving a lien upon the land to guarantee the payment of the cost of reforestation, this payment to be due at the time the timber is cut; or the land should be purchased at a nominal rate, planted, and protected by the Federal Government or the State, the purchaser to be given an option for the repurchase of the land within a specified period after planting.

THE CONCLUSION

The committee urges the following conclusions:

(1) Although interest in forest planting is increasing the actual area planted each year is very small in contrast to the millions of acres which require reforestation.

(2) An investment in planting should be made relatively safe from loss, especially by fire. Organized fire prevention and control has minimized losses from this source. Adequate fire protection is sure to come if extensive planting is undertaken.

(3) Successful commercial planting depends upon a good future market, lands of low value on which to plant, a choice of species suited to the needs of the market and to the conditions, local and regional, relative freedom from sources of damage, a low initial cost of planting and a return on the money invested equal at least to a fair rate of interest. Many examples of successful plantations exist which meet these conditions.

(4) As an investment forest planting is not attractive to the small private landowner excepting where other valuable considerations exist, such as appreciation of land values, the protection of crops by wind breaks, or early returns from quick growing species. The long-time nature of the investment makes planting more feasible for Federal, State and local governments or long-lived corporations, than for the individual or small company.

(5) The problem of reforestation of denuded lands should be met squarely by entering upon a comprehensive plan covering at least a fifty year period. Such a plan should include adequate Federal and State appropriations, an extension of Federal and State forests to include more waste lands, Federal aid for States, State aid for counties, cities and towns and encouragement of private planting.

(6) Sixty-five million dollars at least are being lost annually because denuded forest lands remain unproductive. Reforestation will go far toward lessening the severity of the coming timber famine, provided it is done on a large scale and begun at once.

In general it may be stated that the most dangerous forest-fire periods in the West are in middle and late summer; in the East they are in the spring and fall.

It has been suggested that guayacan, a very hard wood of Central America, may furnish shuttle blocks to supplement dogwood and persimmon, now most used, and in danger of becoming exhausted.

There is a flourishing forest school in the Philippines, and 28 men were graduated with the class of 1913.

Canada cuts about two million cords of pulp wood annually, about half of which is exported for manufacture in the United States.

It is claimed that some of the eucalypts of Australia are taller than the California redwoods, hitherto considered the highest trees in the world.

German foresters are experimenting with Douglas fir from the United States, trying to find a variety which will combine the fast-growing quality of the Pacific Coast form and the hardiness of the Rocky Mountain form.

CLOSER UTILIZATION OF TIMBER

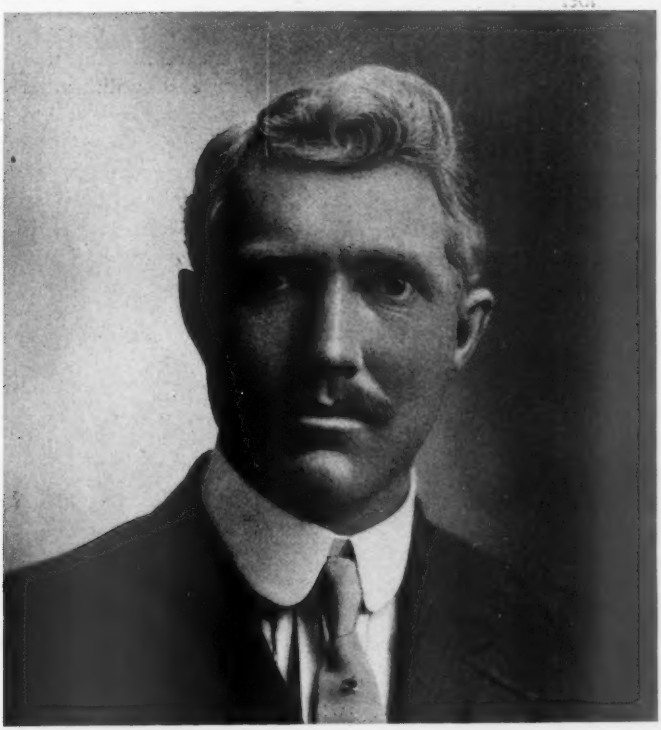
PUBLIC opinion has charged the lumberman with a long series of high crimes and misdemeanors. He has cut unnecessarily high stumps, broken many trees in the felling, left long tips, strewed the woods with skid poles, ties and defective logs, and left to burn up scattered patches of timber containing in the aggregate many million feet of lumber. He has driven logs down narrow, rocky streams where many have become stranded on the banks never to be gathered up. Many others have sunk in dead water to remain forever on the bottom. He has neglected to pick up logs dropped from railroad cars along the track or scattered when wrecks happen, as they sometimes do. When the remaining logs have reached the mill the lumberman is said to have used saws which make twice too much saw dust, to have cut heavy slabs where light ones might be as easily made, to have edged and trimmed the lumber to even inches and feet only, and to have thrown on the waste heap or run out to the burner, vast quantities of short lengths of all his products.

Still further, the lumberman has been accused of failing to follow the modern manufacturing practice of reaping a profit from a wide variety of by-products. It is even said that in the marketing of his standard grades and sizes he has shown little of the foresight and ability of the modern merchant. In short, the lumberman is charged with being wholly inefficient in the planning and operation of his business. A multitude of outsiders have freely offered him unlimited quantities of good advice, and when he has not accepted it, he has been called a wilful waster of one of the greatest natural resources.

In reply, the lumberman acknowledges that he has been guilty of many of the sins of omission and commission charged in the indictment, but he pleads that the extent of the sin depends upon the definition of the word "waste."

Theoretical conservationists may say that 75 per cent of a timber stand is wasted because only 25 per cent of the wood fiber it contains reaches the ultimate user. The practical lumberman whose entire capital is invested in timber will reply that he logs, manufactures and sells every foot that can be handled at a profit and that it is no fault of his if 75 per cent of the wood volume is lost enroute from forest to consumer; he is likely to add, further, that he has handled timber all his life, and that his experience absolutely contradicts the claims of the forester and the conservationist whose knowledge of the subject has been wholly gained from books or popular magazines.

With these contentions to consider the sub-committee on Forest Utilization says it faced its work. This committee is headed by R. S. Kellogg, of Wausau, Secretary of the Northern Hemlock and Hardwood Association, and the other members are Bruce Odell, of Cadillac, Michigan, a member of the Cummer-Diggins Lumber Company; W. C. Miles, of Tacoma, Washington, Manager of the West Coast Lumber Manufacturers' Association, and E. A. Ziegler, professor of forestry at the Mount Alto Forest Academy, Mount Alto, Pa.



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The indictment against the lumberman says that if all the waste which occurs in the manufacture of yellow pine lumber were steam distilled, it would yield more turpentine than the annual production of gum turpentine. It also says that if all the waste occurring in the manufacture of spruce, hemlock and cottonwood lumber were converted into paper, it would furnish all the paper made from wood each year. Both of these statements are undoubtedly true; the question simply is, as to the practicability of making the indicated conversions of waste into marketable products. In operations of this sort, the casual observer starts with the assumption that waste material is cheap material, or in other words, that where small logs, tops, slabs, edgings and trimmings are thrown away, the initial cost is practically nothing if they are taken as raw material for some other process of utilization. Many times this is a serious fallacy. To start with, such material has almost no value and the timber operator is glad to take a nominal price for it; however, the purchaser finds that to put it into usable form, requires such an expenditure of labor that he can better afford to buy merchantable timber for his raw material. The real reason for this is, of course, the present

cheapness of timber of nearly all species; every advance in timber prices means the opportunity for increased utilization, but until thorough experiments are made, it cannot be determined just how far the increase in utilization can go.

One of the means by which the public can increase the utilization of timber is through the acceptation of short and odd lengths of lumber where now only longer and even lengths are taken. Aside from the sills, joists and plates, much of the lumber actully used in buildings is of odd lengths or a mixture of odd and even lengths when put into final position. The outside dimensions are commonly in multiples of two feet, but allowing for the walls and partitions, it is obvious that flooring cannot be laid in lengths which are multiples of two feet. As a matter of fact, the flooring is finally cut to a great variety of odd and

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short lengths. The same practice applies to ceiling, drop siding, and finishing lumber. If building lumber were as closely utilized as factory lumber, and if the contractor or builder ordered the material for a house in lengths actually required, odd lengths and short lengths would find a ready market and much waste could be saved. Under such circumstances both the logger and the mill man could handle defective logs that today have no market value because short lumber does not bring a price equal to the cost of its production. This is for no other reason than that the consumer has been educated to think that if he wants four pieces of board four feet long he must buy a 16-foot board and cut it up into 4-foot lengths. The making of even lengths only for many classes of lumber in our saw mills is entirely unnecessary, as has been proved in British

Columbia where lumber as it comes from the mills is trimmed to odd or even lengths as is most economical. There the long and short lengths are bundled together and sold for the same price as the long lengths, and the odd lengths are sold for the same price as the even lengths because the consumers are educated to the use of these forms.

The committee goes into considerable detail regarding various operations, conditions, etc., all of which are elucidating and valuable, and then concludes by saying:—

The lumber industry needs much more exact, comparative information than it now has upon the merchantable products that can be obtained from trees of various kinds and sizes It is difficult to say to a certainty at what point a tree ceases to be profitable for lumber, and whether it will yield a better return if used for ties, posts or poles, or other products. Moreover, there is a great lack of knowledge of the relative amounts of the different grades of lumber cut from trees of various sizes. Still further, there is not sufficient information upon the labor costs in the making of many by-products, yet the cost of labor may easily be the chief determining factor as to success or failure. Most important of all, little study has been given to the relation between unrestrained competition in timber exploitation and the waste of forest resources.

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The committee recommends, therefore, that if its work be continued, the factors affecting forest utilization here suggested be fully presented to succeeding congresses through a series of reports which will have practical value for both lumbermen and laymen.

There are fifty-five oaks in the United States, about evenly divided between the East and the West. The eastern species, and particularly white oaks, are the most valuable.

The bureau of forestry of the Philippine Islands will send tropical timbers to the United States Forest Service so that their suitability for fine furniture veneers may be ascertained.

Wood block paving, tried and discarded in many cities of the United States thirty years ago, is now coming back into marked favor, due to improved methods of treating and handling the blocks.

The lands burned over during the terrible fires on the Idaho national forests in 1910 are now largely covered with a thick growth of young tree seedlings, by natural reseeding.

THE RELATION OF FORESTS AND WATER

THE great majority of people view the forests of this country as having but two general values; their value for producing timber and that of scenic delight.

Hence the fact that they have a decided influence upon climate; the temperature of the soil; the fall of rain; that they enrich the air with moisture and thus improve agricultural conditions; that they are an effective means of drying up swampy lands and eliminating malaria and swamp fevers; that they draw up moisture from the otherwise unutilized waters of the lower horizontal strata and bring it again into general circulation, will all be more or less of a revelation.

But the forests do not end their active value there. They are of still further aid to mankind. The forests which are in the mountains break the violence of the rain storms over the valleys below; they retard the melting of the snows, prevent erosion and by checking the surface runoff increase the underground seepage and thereby maintain a steady flow of water in the streams. In fact the mean low stages of the rivers as well as the moderately high stages depend upon the extent of the forest cover on the watersheds.

Forests do not prevent floods which are produced by exceptional rainfalls, but they do have such a great influence in preventing unhampered flow of rainfalls into the streams that, without their mitigating influence, the floods would be much more severe and destructive than they now are.

These facts and many more are treated in detail in the report of the subcommittee on Forest Investigations for the Fifth National Conservation Congress, under the title of the Relation of Forests and Water. Mr. Raphael Zon, of Washington, D. C., the chairman of the committee, is a recognized expert on the question and he was ably assisted by F. B. Laney, of Washington, D. C., Prof. Walter Mulford, of Cornell, C. G. Bates, of Denver, Col., and Alec G. McAdie, of New Haven, Conn.

The report says that the forest lowers the temperature of the air outside and above it, the vertical influence of the forests upon temperature extending in some cases to a height of 5,000 feet. The forest lowers the temperature of the soil in summer and increases the temperature of the soil in winter, and this influence extends to a depth of at least four feet. The relative humidity of the air in the forest is higher in the summer than in the open.

Forests increase both the abundance and frequency of local precipitation over the areas they occupy, the excess of precipitation as compared with that of adjoining unforested areas amounting in some cases to more than 25 per cent. The influence of mountains upon precipitation is increased by the presence of forests. The influence of forests upon local precipitation is more marked in the mountains than in the plains.

The reason for an increase in the total amount of precipitation over wooded areas as compared with that of barren and deforested ones is due to the tendency of moisture-bearing currents to precipitate their moisture more readily above or near the forests than over bare or cultivated fields at the same elevation; to

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the fact that the air from forests contains a much larger amount of moisture than the air over bare or cultivated fields, and to the mechanical action of the trees themselves. When a cloud in the mountains passes through a forest the branches and the leaves of the trees retard its movement. It comes, therefore, into a state when it can no longer retain its moisture in suspension, just as a river carrying sediment deposits part of it as soon as the rapidity of its flow is diminished. The moisture from such clouds is intercepted by the forest in the form of mist or drops of dew or crystals of hoarfrost on the branches and foliage of the trees.

Forests in broad continental valleys enrich with moisture the prevailing air currents that pass over them and thus enable larger quantities of moisture to penetrate into the interior of the continent. The destruction of such forests, especially if followed by weak, herbaceous vegetation or complete bearing of the ground, affects the climate, not necessarily of the locality where the forests are destroyed, but of the drier regions into which the air currents flow.

The effect of forests upon streamflow in level countries differs from that of forests in hilly or mountainous regions. In a *level country* where there is no surface runoff, forests, in common with other vegetation, act as drainers of the

soil. Hence the importance in draining the marshy lands and improving hygienic conditions. In such countries the effect upon streams is unimportant.

In the plains and in level country the forest constitutes an effective means of draining and drying up swampy lands, the breeding places of malaria and swamp fevers. The reforestation of the Landes, Sologne, the Pontine marshes, and a hundred other examples prove this. It draws moisture from a greater depth than does any other plant organism, thus affecting the unutilized water of the lower horizontal strata by bringing it again into the general circulation of water in the atmosphere, and making it available for vegetation.

In hilly and mountainous country the forests are conservers of water for streamflow. In the mountains by breaking the violence of rain, retarding the

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melting of snow, increasing the absorptive capacity of the soil cover, preventing erosion, and checking surface runoff in general the forests increase underground seepage and so tend to maintain a steady flow of water in streams. Forests in hilly and mountainous country, even on the steeper slopes, create conditions with regard to surface runoff such as obtain in a level country. The steeper the slope the less permeable the soil, and the heavier the precipitation the greater is the effect of forests upon streamflow.

Forests are the most effective agency for protecting the soil from erosion because the resistance of the soil to erosive action is increased by the roots of the trees which hold the soil firmly in place, and at the same time the erosive force of the runoff is itself reduced because the rate of its flow is checked and its distribution over the surface equalized.

The total discharge of large rivers depends upon climate, precipitation, and evaporation. The observed fluctuation in the total amount of water carried by rivers during a long period of years depends upon climatic cycles of wet and dry years. The regularity of flow of rivers and streams throughout the year depends upon the storage capacity of the watershed, which feeds the stored water to the streams during the summer through underground seepage and by springs. In winter the rivers are fed directly by precipitation, which reaches them chiefly as surface runoff.

Among the factors, such as climate and character of the soil, which affect the storage capacity of a watershed, and therefore the regularity of streamflow, the forest plays an important part, especially on impermeable soils. The mean low stages as well as the moderately high stages in the rivers depend upon the extent of forest cover on the watersheds. The forest tends to equalize the flow throughout the year by making the low stages higher and the high stages lower.

Floods which are produced by exceptional meteorological conditions can not be prevented by forests, but without their mitigating influence the floods are more severe and destructive. The extent of forest land necessary for the regulation of streamflow and the protection of the soil against erosion must be not less than from one-fifth to one-third of the total area of the country.

Forests must be protected not so much in localities which already suffer from lack of moisture as in regions which lie in the path of prevailing winds and are still abundantly supplied both with ground water and precipitation.

In the dry regions large bodies of forest may have an unfavorable effect upon the available water supply. There rows of trees or windbreaks surrounding fields and orchards, by preventing the drifting of the snow and increasing the activity of the wind, will act more as conservers of moisture in the soil than solid bodies of timber.

The care with which forests should be protected in the eastern half of the United States must increase from north to south and from west to east. In the Atlantic plain and southern Appalachians, which are the gateway for the prevailing winds from the Gulf of Mexico and the Atlantic Ocean, forests must be especially conserved if the humidity of the Central States and the prairie regions is to be maintained.

If the clearing of the forest in the Atlantic plain and southern Appalachians is a necessity, it should be done only under condition that the cleared land is to be devoted to intense cultivation, as, after forests, crops contribute most to the moisture of the air.

THE COMMITTEE'S CONCLUSIONS

The committee ends its report by asking how large should be the forest area in a country so as to prevent any bad effects of the destruction of forests upon climate and the water supply in rivers?

There are no accurate means of determining the extent of forest land necessary for the regulation of streamflow and the protection of the soil against erosion. *From the study of conditions, however, existing in other countries it may be inferred that, in order not to disturb the natural balance, the proportion*

of forest land to other kinds of land must be not less than from one-fifth to one-third of the total area of the country.

The facts established with regard to the effect of forests in wide plains of continents, especially in the path of moist winds, allow the following practical deductions to be drawn:

1. Forests must be protected not so much in localities which already suffer from lack of moisture as in regions which lie in the path of prevailing winds and are still abundantly supplied both with ground water and precipitation. In the dry regions large bodies of forests may have the opposite effect upon the available water supply. There only forests growing along rivers may contribute to the humidity of the region. There rows of trees or windbreaks surrounding fields and orchards, by preventing the drifting of the snow and decreasing the activity of the wind, will act more as conservers of moisture in the soil than solid bodies of timber. Therefore, the care with which forests should be protected in the eastern half of the United States must increase from north to south and from west to east.

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Director, District Weather Bureau, San Francisco, Cal.; member of the Sub-Committee on Forest Investigations of the Fifth National Conservation Congress.

2. In the Atlantic plain and southern Appalachians, which are the gateway for the prevailing winds from the Gulf of Mexico and the Atlantic Ocean, forests must be especially maintained.

(a) On moist soils, provided the excess of water or the substances contained in it do not prevent their development, because the moister the soil on which forests grow the more moisture they evaporate. For this reason swamps, since they contribute less to the moisture contents of the air than crops or forests and lose considerable water by surface runoff, must be drained, as by doing this an increase of the evaporation at the expense of surface runoff may be secured.

(b) On sandy soils. Forests on sandy soils readily absorb water through the roots and evaporate it into the atmosphere. Denuded of forest cover, sandy soils readily absorb rainwater which percolates into the ground and often reaches the sea by underground channels without being returned to the atmosphere.

(c) On steep slopes and rocky places; the removal of forests on such places inevitably leads to an increase in the surface runoff and to a corresponding decrease in local evaporation.

3. If clearing of the forests is a necessity it should be done only under condition that the cleared land is to be devoted to intense cultivation, as, after forests, crops contribute most to the moisture of the air. The highest organic production, therefore, is in harmony with the safeguarding of the humidity in the regions which lie in the path of the prevailing winds. Cleared land that becomes waste or poor pastures or grows up to weak vegetation, means so much evaporation lost to the passing air currents.

FORESTRY EDUCATION

THE sub-committee on Forestry Education in the United States deemed it best to confine its investigation this year to a report on ranger schools and short courses in forestry for woodsmen and farmers, and the teaching of forestry in the public schools, which was one of the four subjects assigned to it. This was modified to include all forestry education below that of full technical training as defined by the Conference of Forest Schools.

The committee was particularly well qualified for the work, being composed of Prof. J. W. Toumey, head of the Department of Forestry at Yale College, as chairman; Prof. Walter Mulford, of the Department of Forestry at Cornell; Prof. C. H. Shattuck, head of the Department of Forestry at the University of Idaho, George S. Long, of Tacoma, Wash., one of the leading lumbermen of the Northwest, and W. B. Greeley, Assistant Forester of the U. S. Forest Service at Washington.

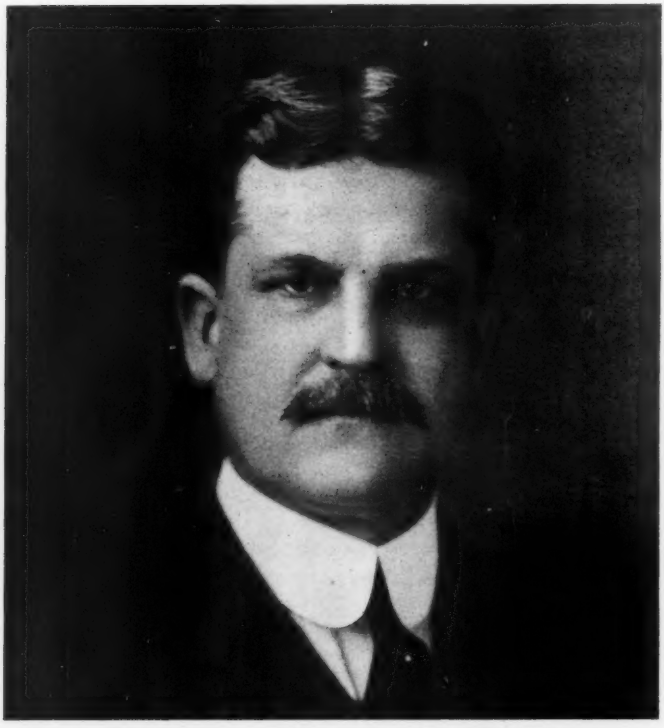
American institutions offering instruction in forestry below the grade of full technical training include universities, agricultural colleges, academies, ranger schools, and, to a limited extent, public schools. A series of tables were prepared by the committee, showing the length and general character of the courses in all American institutions where forestry is taught, exclusive of public schools. The investigations of the committee show the present situation in this country as relates to secondary forestry education and presents in considerable detail outlines showing the specific subjects which should be found in the courses offered by the various classes of institutions where the institution is below that of full technical training.

Most careful consideration is given to:

a. Forestry subjects for public schools and other schools of similar grade.
b. Forestry subjects for college and university courses in the arts and sciences.
c. Forestry subjects for college and university courses in agriculture and horticulture.
d. Forestry subjects in ranger schools.

The training in forestry in the first two of the above groups should, in no sense, the committee states, aim to prepare the student for the practice of forestry, even in subordinate positions. In the third group the chief purpose of the training is to prepare men to practise forestry insofar as it relates to the farm and is carried on with farm work. Instruction in the last of the four groups differs fundamentally from that in the other three, in that its aim is to train men to practise forestry as a trade or business.

It is recommended that public schools give more attention to forestry, but that it be taught in connection with other subjects and not as a separate one, with the exception of agricultural high schools where courses in farm forestry should be taught as separate subjects. In the primary grades forestry should be taught as a part of nature study; in grammar schools as a part of geography and civil government; in high schools as a part of history, botany, agriculture, shop



PROFESSOR J. W. TOUMEY, NEW HAVEN, CONN.
Director Yale Forest School; Chairman Sub-Committee on Forest School Education of the Fifth National Conservation Congress.

work, etc. Detailed outlines are given, in the report, of the various forestry subjects that can be advantageously taught in connection with the above courses.

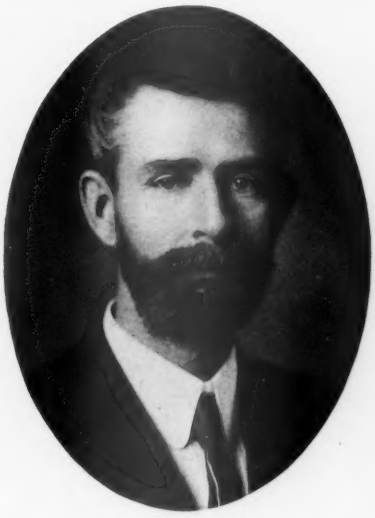
When forestry is taught as a part of the regular collegiate or university training in the arts and sciences, as is the case in nine American institutions, the work should be confined to a single general course, not to exceed thirty-five lectures and recitations of one hour each. No field work should be given. The subjects which should be included in this course are presented in detail.

In those institutions where forestry is a part of the regular collegiate or university course in agriculture or horticulture, as is the case in twenty-nine American colleges and universities, the training should be restricted to approximately twenty weeks. The first five weeks, with two one-hour recitations or lectures per week, should be given to the "Introduction to forestry," in order to give the student a general knowledge of the subject and its place on the economic development of the country. The remaining fifteen weeks should be given to farm forestry; that is, to all phases of forestry that relate to the protection and utilization of timber on the farm. There should be one period of laboratory or field work of three hours and two one-hour periods of lecture or recitations

weekly. The specific topics that should be embraced in the course in farm forestry and the relative amount of time that should be devoted to each are presented at length in the report.

The most important part of the report relates to ranger schools. It is generally recognized that there is need for ranger schools to turn out skilled woodsmen to do all the less technical operations required in managing forest lands and to serve as foremen in directing unskilled labor in woods work.

The ten ranger schools and other institutions which have established ranger courses vary widely in the amount and character of the work included in the curriculum. There is wide variation in the requirements for admittance.



C. H. SHATTUCK.

Professor of Forestry, University of Idaho, Moscow, Idaho; member of the Sub-Committee on Forest School Education, of the Fifth National Conservation Congress.

GEO. S. LONG.

President, Washington Forest Fire Association, Tacoma, Wash.; member of Sub-Committee on Forest School Education of the Fifth National Conservation Congress.

Special attention has been given to developing a plan that would serve as a foundation for the standardization of ranger school training. Our conclusions have been largely based upon the following:

1. A study of the character and scope of the work in American ranger schools and other institutions that offer ranger courses where they have been in operation sufficiently long to determine the needs of the students.

2. A study of the character and scope of the work in foreign schools that prepare men for secondary positions in forestry.

3. The opinions offered by a large selected list of American foresters who replied to a specific list of questions sent them by the sub-committee.

These conclusions are too long to present in detail. They relate, however, to the following:

1. The place of the ranger school in American forestry education.

2. The general character of the work as compared with technical training.

3. The requirements for admittance to ranger schools.

4. The location of ranger schools and their connection with colleges and universities.

5. The length of the ranger school course.

6. The subjects in the ranger school curriculum, and the relative weight of each.

The more specific recommendations under the above headings are as follows:

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Professor, Forestry Department, Cornell University, Ithaca, N. Y.; member of Sub-Committee on Forest School Education, and of the Sub-Committee on Forest Investigatins, Fifth National Conservation Congress.

1. The ranger school should bear the same relation to the professional training in forestry that the workshop bears to research in techology. The instruction should aim to teach the art or trade of forest practice and not the science of forestry.

2. The instruction should be strongly localized. As far as practicable it should be identified with the specific needs of the dominant form of forestry in the locality.

3. Adaptation to the local needs which the school is striving to meet should be the governing principle as to entrance requirements. As graduates must necessarily occupy relatively subordinate positions at low salaries, but a moderate expenditure of both time and money should be required of students. The basis for entrance should be a high school training, although at present applicants should be accepted who cannot meet these requirements, provided they have had considerable practical experience in woods work. The applicant should pass a rigid physical examination and be a man of approved moral character. As the ranger school in this country "does not determine the sphere of activity which the graduate may aspire to," particular attention should be given to the "kind of men" who are taken into it. The age limit should be eighteen years.

4. Ranger schools conducted at colleges and universities are not desirable. While such a school may be included in a college or university for purposes of administration, it should have a separate plant in the woods; its studies, its

faculty, its atmosphere, its morale should be its own rather than merged in that of the larger educational institution.

5. The course should, at present, be restricted to a single year of forty weeks. Under present conditions, considering the positions which the graduates are to fill, this is as much time as can be given to ranger school training. In a few schools, however, where the equipment and faculty are adequate, a second year's work might be offered. Where the students are provided with remunerative work of suitable kinds in connection with their studies the course should extend over a period of two years at least.

6. As to the subjects embraced in the curriculum a fixed standard is neither desirable nor necessary, because the course must be shaped to fit the particular conditions of the region where the school is located. In general, however, all ranger school instruction can be included under the following heads:

1. Fundamental subjects.
2. Secondary subjects.
3. Special subjects.

The first are those essential in ranger school instruction in all parts of the country and embrace fire protection, forest engineering, surveying, estimating and scaling timber, forest botany, elementary silviculture, lumbering, and the preparation of forest maps.

The second are also applicable in all parts of the country but are not essential except under particular conditions. These embrace more advanced silviculture, more advanced lumbering, forest insects and diseases, camping, woods transportation, and first aid.

The third are a group of subjects, one or more of which are essential in the curriculum of every ranger school. In no two schools, however, are they likely to be the same or to be given the same relative weight. Among the more important of these subjects are elementary business law, State forest law, and practice, Federal forest law and practice, elementary bookkeeping, forest zoology, the protection and culture of fish, the protection and breeding of economic wild birds and mammals, grazing, topographical surveying and mapping, forest mensuration, elements of forest management, utilization of special forest products, and the principles of agriculture.

One of the principal by-products of the national forests of Japan is furnished by mushrooms, which have yielded in one year a revenue of $1,000,000.

Articles of clothing from wood fibre are being made in Europe. The material for a suit costs about fifty cents. Clothing made of this material, however, can not be washed.

One of the largest and most valuable timber trees of the country is the tulip tree, known to lumbermen as yellow poplar. It is related to the magnolias, but is the only tree of its kind in the world.

The Republic of Colombia is said to have excellent regulations for its national forests. Lumbermen who take cedar and mahogany are required to plant young trees of the same species in the cut-over spaces.

FOREST FIRES

SEVENTY human lives and twenty-five million dollars loss in merchantable timber is the annual toll taken by forest fires in the United States. This is the average loss since any records were available. It is a conservative estimate.

Now millions of dollars are spent each year in protecting the forests from fire. Ten patrolmen are now employed where there was one five years ago, and in the past five years there has been an increase of three thousand per cent in the area of privately owned forest land patrolled to protect it from fire.

It is a fact that not until the National Forests were created and stumpage on privately owned land became valuable, was there any real effort to prevent destruction of timber by fire.

This year some 92,000,000 acres of privately owned land and 187,000,000 acres of the national forests were systematically patrolled either by privately employed patrolmen or employes of the Forest Service.

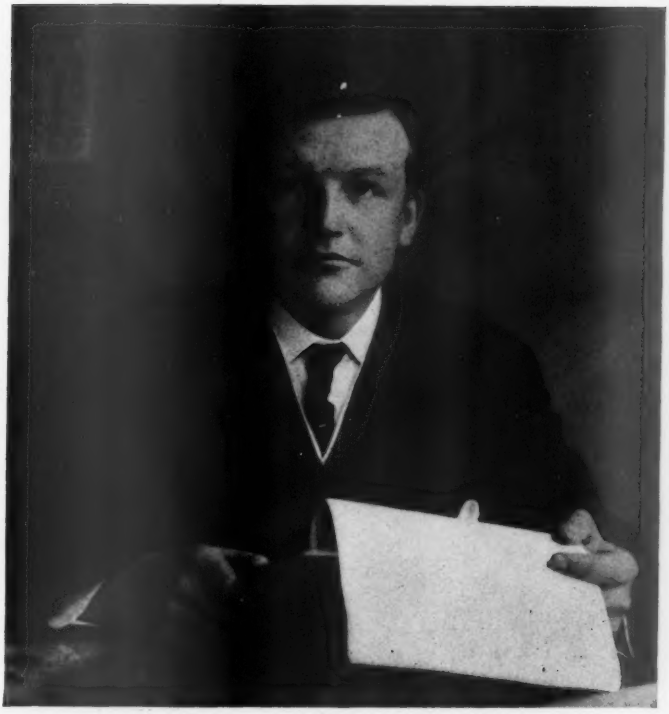
These are some of the most striking of the facts stated by the sub-committee on forest fires in its report to be made to the Fifth National Conservation Congress. This report deals in detail with conditions in each State and treats the subject thoroughly in all its branches. The committee comprises C. S. Chapman, secretary and forester of the Oregon Fire Protective Association, who has had a long experience in forest fire work; D. P. Simons, manager of the Sound Timber Co., of Seattle, Wash., F. H. Billard, of Berlin Mills, N. H., secretary-treasurer and forester of the New Hampshire Timberland Owners Association; J. S. Holmes, State forester of North Carolina, and Coert Du Bois, district forester of the United States Forest Service, with headquarters at San Francisco, and who has had a long experience in fire protection work on the Pacific coast.

The committee goes on to say in a general review of the situation:—

Forest protection on privately owned lands is most intensively carried on in the Northwest, Lake States, New England, and those States adjacent to New England. In nearly all of these sections timber owners are doing as much or more than the State to preserve the forests. With few exceptions, the character of work performed is of a poorer character where the State alone is responsible for fire prevention than where timber owners and the State are working together to protect the forests.

The Federal Government, taking into account the character of its work throughout the United States, is performing the most effective service along fire protection lines. In the Northwest, however, privately financed associations are expending a greater amount per acre to protect their holdings than is the Federal Forest Service.

The Southern States, each of which have a large area of valuable forest land in private ownership, are still backward in protection work. In this section there is every possibility of successfully keeping out fires at small cost, provided actual protection effort is accompanied by systematic publicity work, of a kind to change unfavorable to favorable sentiment towards fire prevention.



C. S. CHAPMAN, PORTLAND, OREG.

Secretary-Manager, Oregon Forest Fire Association, and Chairman, Sub-Committee on Forest Fires of the Fifth National Conservation Congress.

Every timber State has an unquestioned duty to protect the forests. In none of them are appropriations for this purpose adequate.

While nearly all States have at least some forest laws, many still provide for nothing but fighting fires after they become started, and some have no provision whatever for expenditure of funds to protect the forests.

Forest protection through voluntary warden service has in every instance proven a failure. The multiplication of duties of State officials, such as the provision that game wardens or fish wardens also act as fire wardens, has likewise been far from successful, though often tried out.

To secure the best results members of State Boards of Forestry as well as State Foresters and wardens must be free from political interference.

Publicity work in connection with patrol of timber lands is essential to the highest degree of success. Fire patrol associations have used this means of appealing to the public to a greater degree and more successfully than other agencies.

Experience of the past five years has proven that prevention of fires is far better and more successful than the mere fighting of them after once started. To

successfully prevent small fires from becoming large ones, thousands of miles of telephone line and trails have been built, lookout points equipped, and instruments such as heliographs and range finders brought into use.

The plan of co-operative patrol in sections where the State or Federal Government does not take full responsibility for protection has been found far superior to individual effort. Any successful forest protective organization should consist of a detection or fire location force, a patrol force, and a force to apprehend and convict offenders against the law. Strict law enforcement will go far to prevent carelessness, which is the cause of a large percentage of all forest fires.

Railroads still continue to be the greatest single source of forest fires. The past six or seven years has, however, seen a change on their part from one of indifference to the keenest interest in assisting to prevent fires. The more general use of oil as fuel has likewise greatly reduced the number of railroad fires.

The so-called "light burning" theory advocated by certain timber owners in California and adjoining States is especially to be condemned. It is not only impractical from a financial standpoint, but causes destruction of young timber and makes for carelessness with fire on the part of the public.

With present protective machinery perfected, it is believed that fire damage during ordinary years can be practically eliminated, and that in extraordinary years it can be kept down to a small percentage of the board foot stand of a locality. With this reasonably well assured, it is felt that insurance on standing timber can be safely offered.

Thorough co-operation in protection work between the Federal Government, states, and private owners is believed essential to success, and to this end the continuance of the Week's Law appropriation is urged. This financial assistance offered by the Federal Government to States actually engaged in forest protection, has had a beneficial influence far out of proportion to the amount of money expended.

CO-OPERATIVE VS. INDIVIDUAL CONTROL.

Dealing with the cooperative versus the individual patrol method of fire protection, the committee says:—

The replies received by the sub-committee from different sections of the country, in answer to the question, "What is your opinion as to the efficiency of co-operative versus individual patrol?" were almost unanimously in favor of co-operative patrol.

The first co-operative patrol, so far as our information goes, was organized in the Pan-handle of Idaho in 1906. Since that date the movement has spread all over the Pacific Northwest and into the Lake States, New England, and Canada.

With the recognition of the principle that patrol to prevent fire was far better than fighting fires already under way, the employment of patrolmen by timber owners became not uncommon and, once started, these private patrols increased in number and effectiveness from year to year. Timber owners soon

found, however, that they could often combine with each other and put on men to cover a given watershed or township, and that failure to do this resulted in several men going over the same ground, an unnecessary and expensive operation. Some few owners took advantage of the fact that other timbermen had to patrol their lands in looking after their own and, by failing to do their share, escaped expense. This often led to hard feeling and unpleasantness and hindered the general movement.

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COERT DU BOIS.

District Forester, Forest Service, San Francisco, Cal.; member of the Sub-Committee on Forest Fires, of the Fifth National Conservation Congress.

From individual and small joint patrols it was but a step to the larger, co-operative patrols covering a State, county, or district. In many cases owners adjacent to national forests found it advisable to co-operate with the Forest Service, and are still doing this. The co-operative patrols, when once started, proved to have many advantages over individual effort. The few owners who felt that they could get better results than an association because they were more directly interested, soon found that the advantages, financially and otherwise, of co-operative patrol made it to their advantage to affiliate with a forest fire association. Some owners still maintain their own patrols, but the number is each year becoming smaller.

Co-operative patrols, which are now running successfully, have not reached this point without some opposition and much annoyance. One of the hardest obstacles to overcome, particularly in the Northwest, was the opposition of local representatives of Eastern owners. Some of these representatives felt that part of their usefulness to their principals would be done away with if the patrol management was taken out of their hands. By misrepresenting the condition of

affairs to the owners whose ear they had, much needed acreage was for a time kept from affiliating with fire patrol associations, often resulting in defeating the formation of a patrol organization in a section.

Early in fire protection work it was found that settlers, campers and pleasure-seekers in the timber often resented being told by employees of timber companies when they could or could not burn, or what should be done to prevent spread of fire. Forest fire associations, however, which are generally recognized as public good organizations and employees, have experienced little opposition of this nature. They invariably have the support of the press and of other public good organizations.

The fact which perhaps appeals most strongly to timber owners is that forest fires are no respecter of persons, and property lines do not stop them, and hence that concerted action in protection is the only safeguard. A patrol is as strong as its weakest point. It is not sufficient that part of a township or county be patrolled; it must all be looked after, or none of the property in it is safe.

Under an individual patrol system there will be many gaps where no protection is given. From the start, patrol associations have assumed the care of all of the land within their exterior boundaries, unless the individual owner of some property had on his own patrolmen. If owners refuse to pay their share, they get their lands looked after free, and at the expense of the other owners. Few people care to be put in this position and generally join the patrol or put on a man of their own. An owner may be willing to let some particular company look after his property and refuse to reimburse the company for its work. But when practically all of the owners in a county join together few individuals care to have it said and known by this large aggregation of holders that he accepts something for nothing.

The committee concludes that where once established the cooperative patrols have never been abandoned for individual effort.

Emphasis is laid on the value of publicity as a medium of fire protection and the committee says:—

THE VALUE OF PUBLICITY

There are distinctly two branches of publicity or educational work in use by those engaged in forest protection, both of which are of immense importance.

1. The education of hunters, fishermen, campers, loggers and ranchers, through the medium of rangers or patrolmen who come in contact with these people.

2. Education of the general public, and of county and town officials, through circulation of printed matter, talks at public gatherings, motion picture films, newspaper items, advertisements in papers, booklets which reach the desired class of people, and by posting notices in conspicuous places.

No patrol or fire fighting organization can hope to get the maximum of results unless public sentiment is favorable to the work being performed. Op-

position to forest protection, now practically eliminated, has been mainly from two sources:—

(*a*) People who thought their personal rights were being interfered with, through laws and regulations requiring them to be careful with fire and prohibiting burning when certain conditions existed.

(*b*) Those who thought efforts to prevent fire would be futile and that money expended to this end was thrown away.

While many minor matters in method of work brought opposition, the main adverse criticism can be largely traced to these two sources.

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State Forester of North Carolina, member of Sub-Committee on Forest Fires of the Fifth National Conservation Congress.

F. H. BILLARD, BERLIN MILLS, N. H.
Forester of the Berlin Mills Paper Co., member of the Sub-Committee on Forest Fires, of the Fifth National Conservation Congress.

Echoes of discontent on the part of those who think their personal liberties are being abridged are occasionally heard at legislative times, and generally originate from ranchers who feel they should be allowed to burn their slashings whenever they see fit, without regard for the safety of other people's property. At this time, however, the rights of adjoining property owners are generally recognized.

The second criticism has been thoroughly answered by the government and the private patrols controlling fires, even though handicapped with forces far too small to adequately do the work.

A great deal of good can be done by field men employed by a fire protection agency, aside from their active work of discovering and putting out fires. It has been the policy of the Federal Government, many States, and most private organizations to have their rangers cultivate the acquaintance of the people in the

territory they cover. By doing this they not only establish personal relations, but are able to explain what the fire laws are intended for, and what the patrol organizations are trying to accomplish. By helping ranchers with their burning when possible, and letting residents know that their object is not to hinder but help the development of the country, wardens can usually secure the confidence and support of the people, who in turn can be of great service in preventing fire.

The general policy with regard to treatment of campers, hunters, and fishermen is also to be courteous and helpful to them. By giving them accurate information as to the best camping, fishing and hunting grounds their support is usually secured and many people taking their vacations in the mountains return with a high regard and respect for the work being performed by the fire patrolmen.

In case of emergency and as a strict business proposition a patrolman should know every resident in his territory, and while getting acquainted he can carry the gospel of fire prevention.

Publicity or educational work as carried on through circulation of literature has proven of wonderful benefit. In any section where forest fire associations, the Federal Government, or the States are maintaining patrols, every road and trail is thoroughly posted with fire-warning notices.

From using only notices quoting the laws, the custom has now grown up of using posters containing a short catch sentence regarding fire hazard, pictorial posters, popular appeals to campers and hunters, and in fact, any kind of notices which will catch the eye and be read. It has been generally found that to keep people reading fire-warning notices, at least, some new ones should be gotten out each year.

Pamphlets distributed among school children calling attention to the value of the forest crop are very valuable from an educational standpoint. If the younger generation can be brought up with the need for forestry and forest protection thoroughly implanted in their minds, protection in the future will be made infinitely easier than it is today. Similarly printed material made to appeal to the general public is now in many sections widely distributed just before the fire season. Such literature is found in hotels, farm houses, court houses, garages, etc.

Fire-warning notices in telephone books, railroad folders, county fair bulletins, commercial club literature and places of this kind have large circulation and probably more effect than most people realize.

One very effective means of calling attention to the need for care with fire is to have rangers distribute safety matches, on the boxes of which is a request that the recipient use every precaution to see that no fires start.

The press has always been most active in helping fire prevention by lending its pages to any matters which have news value. Some of the associations make it a point to send to all papers in their territory weekly or periodic bulletins on the fire situation, what is being done along protection lines, and matters of this nature.

Several years ago the Forest Service interested the clergy of Oregon and Washington in protection work, and many sermons were preached on the benefits

from protecting a valuable resource against needless destruction. The effect of bringing attention to the matter through such a medium was very far reaching.

Numerous other ways of bringing the importance of protection before the public might be mentioned such as motion picture films of fire fighting, special magazine articles describing the work of State, Federal and private protection agencies, lectures before granges and educators, the use of stickers on envelopes, and stamps on pay checks. It is, however, sufficient to say that in carrying on an educational campaign every available means of getting facts before the public in a striking manner which will appeal to them must be utilized. The work is not so different from commercial advertising. The main thing is to decide on a definite campaign and stick to it. Although its benefits are not measurable in dollars and cents, probably no single line of effort has done more to prevent fires than well-directed publicity. Long papers or bulletins on the subject are of little use for the average person who has to be reached. Popular catchy advertising is necessary.

The importance of having forest protection touched upon in the public schools of timber States, and of doing everything possible to properly educate the children in forest matters, is considered of paramount importance, for the effect such procedure will have on the future of the work.

The committee then deals in detail with fire fighting tools and apparatus, discussing measures for conducting patrol; speaks of the value of spark arresters and the necessity of proper protection by railroads and devotes considerable space to the various protective systems including patrols, lookouts, trails and telephone lines.

An important part of the report is that which speaks of the future work for a committee on forest fires, and this section says:—

FUTURE WORK FOR A COMMITTEE ON FOREST FIRES

The Sub-committee on Forest Fires probably realizes more forcibly than any one else that its report falls far short of bringing to light all of the available information on the subject under discussion. The experience of different members of the committee in their endeavor to secure data, has likewise given them a clearer insight into what should be obtained and how to go about it, than those not intimately connected with the work of the committee.

It is the opinion of the committee that the work it has undertaken should be continued, the crop of the work enlarged, and that a more specific and complete report be submitted at some future time.

It is believed that more complete and detailed information on just what is being done by the different States should be collected and tabulated. This should include figures showing as near as possible the extent and value of each State's forest resources for various purposes, and the importance of the lumber industry to the State. The work of all agencies in each State should be carefully analyzed and in the case of each, definite and clean cut recommendations made for improvement where needed. Such a report would of necessity deal with forest fire laws, and so possibly encroach upon the field of another sub-

committee, but it seems impossible to segregate the work of the different agencies in a State if all are properly working together.

A much more careful compilation of areas adequately and inadequately protected in each State would be of interest and of value to students of forest protection.

A careful analytical comparison of the administration of forest protection work in several of the States now being best handled would also be of interest and practical benefit to a large number of people.

A definite plan for exchange of information between different agencies, though perhaps not within the province of this committee and possibly already covered in some report, is a matter of utmost importance. Protective agencies have much to learn from each other.

Data regarding, and if possible drawings, of all tools or implements used in fighting fires should be gathered and carefully presented. No one person has intimate knowledge of all such devices and often an implement use in Pennsylvania might be well adapted to Washington or vice versa.

The most complete data available on both sides of the so-called "light burning" theory might also be a subject for future presentation.

Other matters not mentioned or treated in this report could with benefit be later considered, such as planning permanent improvements, the building and proper use of fire lines, and matters of this kind.

However, probably the greatest good could be done along protective lines by the conservation congress and with public service organization, if some practical scheme were devised for spurring to action the legislatures of those States which now take little or no interest in the subject. The object would be to secure better forest laws for these State. Possibly a more thorough presentation of present conditions in such States and the recommendation of definite remedies, would in a measure serve to stimulate the proper officials to action.

Another matter well worthy of careful study is insurance for standing timber. This subject has so far had scant consideration. The perfecting of patrol systems and through these the lessening of risk, makes timber insurance at this time a pertinent matter for discussion.

The Massachusetts Forestry Association is opening its winter campaign with six trained foresters as field secretaries, doing practical work in forestry lines and organizing Branch Associations. The acquisition of State Forests is a matter of legislation which is to be pushed this year by the Association, and the annual meeting will be given over to that topic. A bill for the taxation of wild and forest lands and another on the disposal of slash will also be a part of the schedule of legislation for the coming year.

The largest tree in the United States is said to be the "Mother of the Forest," a giant redwood in the Calaveras big-tree grove in California. It is supposed to contain 140,619 *board feet of lumber. There are, however, many claimants for the honor of being the "largest tree" and the "oldest tree," and these claims, according to foresters, can not always be verified.*

Manufacturers of artificial limbs are seeking substitutes for English willow, used because of its combined lightness and strength. It is asserted that the Port Oxford cedar of the Pacific coast will prove equally serviceable.

FOREST TAXATION

THE question of forest taxation is admittedly one of the most important of the problems of the timberland owner, and of those who desire to encourage replanting and to provide for reforestation. The sub-committee on Forest Taxation which makes its report to the Fifth National Conservation Congress provides a discussion of the existing conditions, and conclusions regarding forest taxation laws which will be of service all over the United States.

It is a committee composed of men ripe in experience, comprising as it does Gifford Pinchot, former chief forester of the Forest Service; F. R. Fairchild, of the Department of Economics of Yale, a well-known taxation expert; Henry S. Drinker, President of Lehigh University and President of the American Forestry Association; E. T. Allen, secretary and forester of the Western Forestry and Conservation Association, and E. M. Griffith, State Forester of Wisconsin.

The committee treats the subject in four sections, the first being the present State forest tax legislation; the second, the basic principles of wise forest taxation, with definite suggestions for legislation; the third, the taxation of forests in Europe, and fourth, the bibliography of forest taxation.

The whole present situation is pertinently expressed in one sentence of the report, which says:—

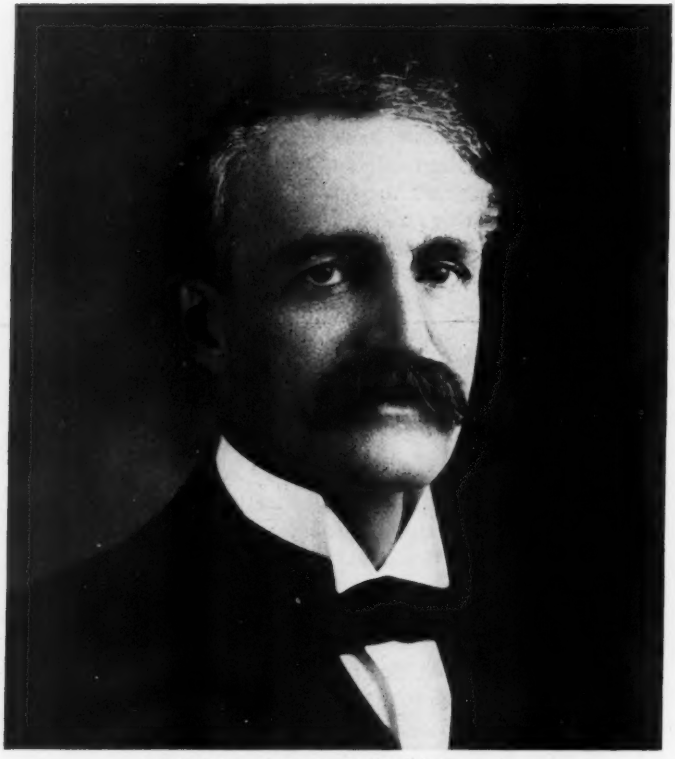
"By failure to recognize that the growth produced is a crop, distinct from the land, grown at the owners' effort and expense, and returning no revenue until ripe, the law now compels the repeated annual taxation of the owners effort to an extent very likely to amount to confiscation."

The present condition is, however, so well known to the owners of timberland and others that the reasons why there should be a form of taxation which would encourage the perpetuation of the forests will not be as interesting as the principles for wise forest taxation with suggestions as to securing the passage of satisfactory forest taxation laws.

The committee first presents a plan for forest taxation for the eastern and neighboring States where mature virgin timber is not the dominating type. In respect to this plan the committee says:—

In presenting the following outline your committee has purposely avoided going into minute details as to the tax system or its administration. Such details must always be made to conform to local conditions and must, therefore, vary from State to State. Our purpose has been to present, in somewhat general terms, the outline of a sound plan of forest taxation for the region under consideration.

Where exact figures are used in the following plan, to specify tax rates, age of timber, intervals of assessment, etc., the figures selected are those which appear to be adapted to general forest conditions. Your committee does not intend, however, to insist upon the exact figures in any case. They are presented largely

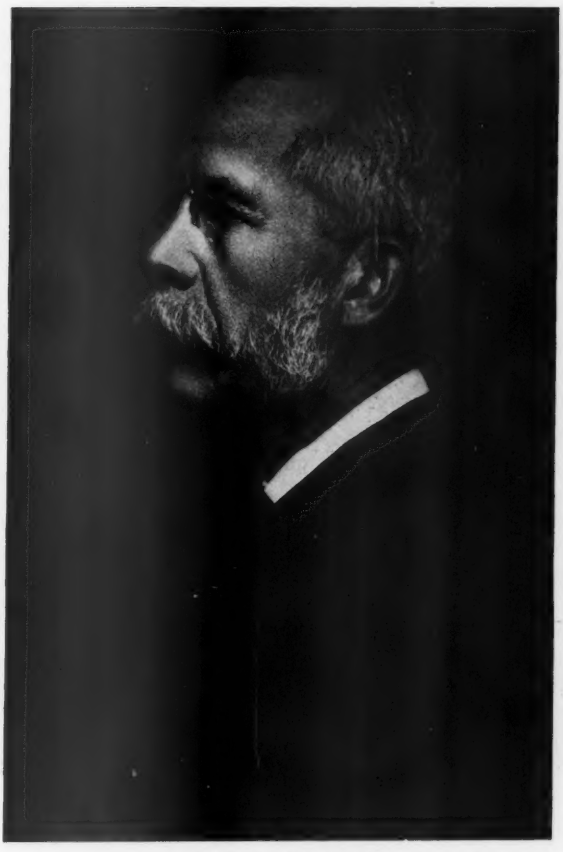


GIFFORD PINCHOT, WASHINGTON, D. C.
President, National Conservation Association, and Chairman, Sub-Committee on Forest Taxation of the Fifth National Conservation Congress.

for illustration, and the principle of the proposed plan may be carried out while substituting other figures as conditions require.

1. *Lands subject to special taxation.* The special forest tax should apply to all lands on which forests are growing and which are handled and protected in accordance with the methods of practical forestry, as defined in general in the law, which should be administered by the commission, board or officer entrusted with the direction of State forest work.

Lands subject to the special tax shall be valued at not over — dollars per acre. (This value should be fixed so low as to exclude lands better suited for other uses than forestry.) Lands shall be separately classified and brought under the system at the owner's option. Owners desiring special classification may make application to the State forester, accompanied by a certificate of the local assessor stating the value of the land, valuing separately the different parcels if so directed by the State forester. The State forester shall examine the forest and if he finds it meets the legal requirements shall certify the forest for separate classification and taxation.



HENRY S. DRINKER.
President of Lehigh University, President of the American Forestry Association, and member of the Sub-Committee on Forest Taxation of the Fifth National Conservation Congress.

Lands thus separately classified shall remain so as long as the forest is properly conserved as determined through inspection by the State forester. Lands may be withdrawn from such classification at the option of the owner on paying the tax provided below.

2. *The tax.* Forest lands when separately classified for taxation shall be subject to a special method of taxation.

Two methods are proposed, depending on whether the forest is a "new forest" or an "established forest."

By a *"new forest"* is meant lands stocked with forest trees, the majority of which are not over 10 years old, provided that the older trees do not add to the assessed value of the property and that the forest meets with the other requirements of the law. This may include land fully stocked with trees under 10 years of age but containing also scattered older trees, or lands partially stocked

with trees under 10 years of age when planted with a sufficient number of additional trees to bring the forest to the standard set by the law, or open land planted with trees to meet the standard of the law. Such forests, when accepted and classified, shall be taxed by the following method:

The land shall be assessed by the local assessors at its value as bare land, no account being taken of the value of the trees. This assessment shall be repeated at intervals of 20 years until the prevailing age of the trees reaches 70 years. Upon the value thus determined the land shall be taxed annually at a

F. R. FAIRCHILD, NEW HAVEN, CONN.
Professor of Political Economy, Yale University, member of the Sub-Committee on Forest Taxation.

E. M. GRIFFITH, MADISON, WIS.
State Forester of Wisconsin, member of the Sub-Committee on Forest Taxation.

rate equal to one-half of the rate of the general property tax of the locality, but in no case to exceed 5 mills. This limit of 5 mills is chosen on the assumption that 10 mills is probably slightly in excess of the average rate of the general property tax upon true value throughout the United States. In any State where it appeared that the prevailing rate of the general property tax was appreciably higher or lower than 10 mills this rate might be correspondingly changed. This explanation applies equally to the limit of 10 mills proposed below for the tax upon forests over 70 years of age and upon "established forests."

Whenever any timber is cut or other forest product taken from the land a yield tax of 10 per cent of the stumpage value of the timber cut or the actual value of other forest products shall be paid to the State. Forest products cut for domestic use, which shall be limited to fuel and the construction of fences, buildings, and other improvements upon the property of the owner or of a tenant with the permission of the owner upon property subject to taxation in the same town as the timberland, shall be exempt from taxation.

Whenever trees are cut before reaching the age of 70 years and provision is made for planting new trees or otherwise perpetuating the forest according to the standard fixed by law and to the satisfaction of the State forester, the land may continue separately classified and subject to the special tax indefinitely until the timber reaches the age of 70 years.

When the timber reaches the age of 70 years there shall be an assessment of the value of both land and trees, which assessment shall be repeated every 10 years (or oftener), and upon this assessment an annual tax shall be imposed at the rate of the general property tax in the locality, but not to exceed 10 mills, which tax shall continue until the trees are cut. When the trees are cut the yield tax of 10 per cent shall be assessed. From the amount of the yield tax shall be deducted the amount of the previous payments of the annual tax upon land and trees since the trees reached the age of 70 years. If the amount of such previous payments equals or exceeds the yield tax upon the timber cut, no such yield tax shall be due. If after cutting provision is then made for planting or otherwise satisfactorily reproducing the forest, the lands may remain under special classification and taxation, as previously provided for "new forests."

If the owner desires to clear off the timber before it has reached a profitable age for cutting, he shall be at liberty to do so upon paying a tax determined as follows: The value of the timber shall be assessed and a tax computed amounting to 1 per cent of said value multiplied by the number of years since the forest was classified and made subject to the special tax. To this shall be added an amount equal to the total taxes paid upon the land alone during the period since the land was separately classified, and this sum shall be the amount due from the owner. The property shall then become subject to the ordinary property tax. The same procedure shall be followed in any case where the owner fails to maintain the forest according to the standard set by the law as determined by the State forester.

3. *Administration.* Under this system the collection of all taxes on land and trees except the yield tax would naturally be in the hands of local officers and the revenue would go into the local treasury without further concern on the part of the State. The yield tax, on the other hand, and the tax collected as a penalty for removal of the land from classification or abandonment of the forest should be administered so far as possible by State officers, presumably by the State forester and the State tax commissioner in cooperation. The proceeds of the yield tax and the penalty tax go into the State treasury, either to remain there or if thought best to be distributed back to the towns and counties where the timberlands are located. This distribution might be made according to any one of four or five possible plans. (See Proceedings of the Sixth Conference of the National Tax Association, pp. 385-389.) Your committee recommends, as probably best suited to the conditions of most States, that the distribution be based upon the areas of forest lands separately classified for taxation in the several local jurisdictions respectively.

In all cases the owner should be required to furnish a sworn statement annually of the amount and value of forest products cut during the year. It might also be well to require advance notice of all cuttings. Large owners,

lumbermen, loggers, saw-mill owners, and so forth, should be required to keep regular books giving a record of their cutting. Their books and accounts should be open to State officers and more elaborate reports could be required of them. In the case of small farm wood-lots it would not probably be worth while to require special books or elaborate reports. The sworn statement of the owner would ordinarily be sufficient. In all cases there should be some examination of logging operations, either by State or local officers, to check up the accuracy of reports and to prevent fraud. In the case of all large cuttings the owner or operator should be required to furnish a bond sufficient to cover the amount of the tax that will become due. The tax should also be a lien upon the land, but not upon the timber cut.

DIFFERENCE IN WESTERN CONDITIONS.

The committee then dwells at some length upon the difference between the conditions in the Pacific Coast States and those in the Eastern States, and states that while the eastern conditions apply to a numerically greater group of States it is felt that the Pacific Coast situation is entitled to even fuller treatment, not only because of the immense area involved but also because it has received less attention in tax study and legislation. Its problems are less understood and there is greater danger in unstudied borrowing of ideas.

After discussing the conditions in detail, the committee says:

In considering which of the three fundamental plans of taxing new crops to apply to the foregoing Pacific coast situation, we must analyze its elements of difference from that outlined in the preliminary paragraph of our discussion of eastern conditions. In the older parts of the United States the relative value of any tract for forest production and for other uses is fairly well established, and so is its taxable value. Such classification in many parts of the West would be most conjectural. In a new and rapidly settling region, with land quality and clearing costs both uncertain, it may be impossible to say whether land assessed at $3 today will in five years be worth $10 for grazing, $50 for agriculture, or but $2 for forest growing and nothing else. A pioneer community, especially if poor in any other taxable wealth, is more dependent on an annual land tax than one already provided with roads and schools. A region still rich in forests is less likely to forego a present tax in favor of a future population than one which already feels the pinch of shortage. One in which neither forest science nor adequate market has developed exact information about growth of the crop or price it will bring cannot deal so exactly by statute; therefore safety from error requires leaving more to future study and experience. One where fire hazard is greatest must depend least upon the yield tax.

While the measure we have previously outlined as suggestive for eastern conditions would also be good in the West if it could be passed and maintained for a time in succesful operation, it is likely that Western States would consider more favorably a simpler plan and one which, while collecting about the same aggregate tax, realizes more of it annually. Such a plan is the first of the three fundamental ones originally mentioned. It is theoretically somewhat the least favorable of the

three to the forest owner, but easily understood and much more encouraging than the present general property tax.

In speaking of the increasing interest in States acquiring land in lieu of taxation the committee says:—

STATE ACQUIREMENT IN LIEU OF TAXATION

We have hitherto discussed taxation of mature timber solely as a project of tax reform. There is, however, a growing interest in the possibility of affording needed tax relief on timber in return for the land after the timber is removed. Many people believe reforestation must be chiefly a State rather than a private function. This is undoubtedly true of land whose chief value is for protection, and not for the production of commercial timber. Probindifferent owners. State ownership of such cut-over land is often desirable. ably also much land that would afford good returns under forestry will have Devices for securing it without purchase, in lieu of taxes, are particularly worthy of attention, if they do not seriously interfere with revenue, because they may be made to insure leaving it in good condition for reforestation.

It is hardly likely that complete State assumption of forest land for this purpose will be practicable in States largely forested. The burden would be tremendous for many years. Concession of taxes to the original owner would be at immediate sacrifice, even if at later profit; consequently would require bonding or some other form of carrying this cost. Nevertheless a very considerable engagement in forestry by the State is always desirable.

There are various ways of accomplishing this through taxation, all based on contract or classification under which, for partial or complete remission of taxes, the State acquires eventual title. A somewhat different suggestion has been made to tax the land annually and let the county issue timber-tax certificates, bearing interest which it collects annually with the land tax, and secured as a lien against the property. These certificates are to be sold to investors, who receive the interest from the county. If accumulation of certificates against the property approach too closely its security value should the timber be destroyed accidentally, bond must be provided.

When the owner desires to cut he must pay all accrued taxes, when release will be given, but the State, at its option, may pay such indebtedness, plus the assessed value of the land, and acquire ownership after cutting. The amount of the timber tax is not an essential part of this plan, for it may be either the present general property tax levy or an automatic stepping-up of an originally determined rate such as we have discussed elsewhere. Without careful safeguard it would tend to be even more excessive and unjust than under the present system.

It is hardly within the province of this report to discuss such plans at length, for they involve much else than taxation, but if adopted guardedly to prevent too great State obligation they may be of high importance in settling many tax problems.

FORESTRY PUBLICITY WORK

ONE of the necessary means to success in forest conservation, in any or all of its phases, is publicity. People must know what you are doing, or what you propose doing, and how you are to accomplish it before they can be expected to give their aid. They may be informed by publicity of various kinds, and impressed if the publicity is of the proper brand.

As the Sub-Committee on Publicity about forest work for the Fifth National Conservation Congress very well puts it:

"Progress in forestry depends more on what the public permits than upon foresters and lumbermen."

This committee was fortunate in having E. T. Allen, secretary and forester of the Western Forestry and Conservation Association, as its chairman, for Mr. Allen is a past master in the art of publicity. The other members are T. B. Wyman, of Munising, Michigan, whose activities in that State are very well known by foresters and lumbermen; F. W. Rane, the State forester of Massachusetts; Overton W. Price, vice president and treasurer of the National Conservation Association, and P. S. Ridsdale, executive secretary of the American Forestry Association and editor of AMERICAN FORESTRY, all men who have had considerable experience in publicity work.

The report bristles with ideas, suggestions and declarations of successes achieved by various forms of publicity and will be found of very great practical value not only by members of forestry and conservation organizations but by any persons desiring to give publicity to any cause.

The committee, in a general review of the subject, says:

If every citizen, in whatever capacity, fully realized all that is involved by the waste or preservation of forest resources; fully knew his own relation to it, and what conduct of his would best serve his welfare and the community's; fully understood the economics of forest industry and what governs the conduct of its members, and fully comprehended the power and responsibility of the commonwealth in protecting the interests of its constituents, there would be little need of forestry associations and congresses. The reason why publicity for most forestry topics is vital is that they are given proper consideration by a very inadequate proportion of those whose conduct is involved.

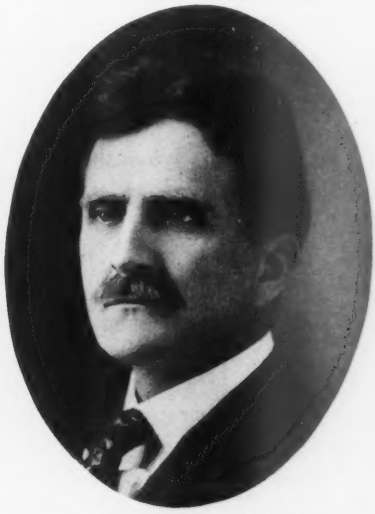
Government, State, and private forestry workers are accomplishing a great deal. Yet what one of us does not often have the baffling feeling that we are battering at a wall far too strong for our facilities, while this is at the same time the reason why our facilities are inadequate? We cannot hope to have the industries dependent upon the forest fostered and protected as they deserve until public and legislators regard them as they do agriculture, for example, and have equal understanding of their governing conditions and needs. They will not attain such understanding unaided, the aid is limited by their demand for it, and they will not demand it because they do not understand the need.

It looks like a deadlock, yet deadlocks can usually be broken. If lumbermen and foresters would realize the need to devote as much study to the technique of public education in forestry as to the technique of forestry practice, the deadlock would break. And the movement would gain in geometrical ratio as knowledge of forest economics creates a thirst for more knowledge.

This is not conjecture. It has been proved. Progress differs locally almost exactly with the degree in which propaganda has been skilful. And skill has been proven to lie largely in the realization by propagandists that forestry is business, not merely an abstract problem of public or private conscience, and in their consequent application of business advertising principles. There are two methods of attack. The old way works about as follows: "You are partly

OVERTON W. PRICE, OF WASHINGTON, D. C.

Vice-president and Treasurer, the National Conservation Association, and member of the Sub-Committee on Publicity of the Fifth National Conservation Congress.



F. W. RANE, OF BOSTON, MASS.

State Forester of Massachusetts and member of the Sub-Committee on Publicity of the Fifth National Conservation Congress.

responsible for lack of forest protection. Forest destruction is bad for the country. Badness is wicked. Therefore you are wicked. You need a sermon and we'll preach it." The new way works more like this: "Do you want to make more money as well as do your duty? Then stop the other fellow from destroying dollars you would otherwise share. We have a bargain-price insurance policy that you can't afford to be without. Look over our prospectus and invest."

Now forest preservation *is* insurance and insurance is good business. We are offering the public a commodity that must be paid for in money and careful conduct, and we must convince the public that it is worth the price. We must arrest attention, which is being sought by plenty of competitors. We must hold

interest when we get it and make good with our argument. All of this involves a knowledge of exactly the same elements of human nature, of the same principles of psychological appeal, that must be the foundation of every successful contest against the inertia of humanity, from the wiles of the side-show barker to the trained persuasiveness of the insurance agent and the publicity devices of the modern advertising genius. We may reach the thoughtful minority by calm logic or appeal to public spirit, but it is the thoughtless majority that we are really after. What we say to these must be not only what "he who runs *may* read," but what he *will* read, *will* remember, and *will* act upon.

P. S. RIDSDALE, WASHINGTON, D. C.

Executive Secretary, the American Forestry Association; Editor of AMERICAN FORESTRY, and member of the Sub-Committee on Publicity of the Fifth National Conservation Congress.

The average man does not want mere logic. But if you can *stop* him a moment, and photograph an idea upon his mind in spite of him, you not only have the idea there where he cannot get away from it, but he is favorably disposed toward the idea itself. For in his mind is also a feeling that it was probably his idea all the time, else he couldn't have responded so quickly—a feeling you don't get when you have to hold a man a prisoner in a corner until you force him to admit rather unwillingly the correctness of your argument.

This is not a plea against dignified, scholarly appeal to reason, nor against appeal to high motives of citizenship and responsibility. It is merely the plea that to get a large proportion of our population interested in forest affairs we should adopt methods that experience has proved most effectual in getting its interest in anything else. It is to modern business and political campaigning that we must look for the last word in the psychology of appeal to human ignorance and indifference. Apply the methods that experts in these lines employ, improving them if you can, and you are probably putting the hardest possible punch behind forest propaganda.

Then if our first premise is true—that public interest and understanding are essential to satisfactory forestry progress—it follows that technical training and ability in publicity is a necessary part of the equipment of forest workers. What does it avail you to devise a perfect forest law if you have not the knowledge of legislative manipulation to get it passed? Are even perfect fire-fighting organization and methods as valuable as reducing the number of fires to find and fight? Why learn how to manage forests properly unless you can convince owner and

public that it pays? Why be a public forest official when you cannot tease enough funds out of the community to do satisfactory work? Why take four years out of a boy's life to fit him for a forestry job and teach nothing to help him create a demand for his services? Why devote a forestry convention to discussion of needed laws and practice and go home with no more knowledge of how to make your community let you apply them?

Nothing more clearly indicates the neglect of this subject by American foresters than the difficulty met by this subcommittee in finding material for compilation in its report. Hardly any writers have discussed it in a comprehensive way. Publicity devices are borrowed and changed more or less, but few men are giving them much original thought. Forest legislation is notoriously retarded by lack of skilful, well-financed campaigning. So-called press bulletin work is growing in popularity with forestry organizations, public and private, but is often defeating its own strength by failure to present real news in newspaper form. Cartooning, the greatest modern educative medium, is employed the least. The purpose of this report, however, is not to discuss past failures or past achievements, but to outline the main directions in which forestry publicity should be developed.

T. B. WYMAN, MUNISING, MICH.

Secretary, Northern Forest Protective Association, and member of the Publicity Committee of the Fifth National Conservation Congress.

The subject is treated in much detail, and is so complete that there is hardly any form of publicity open to the general worker about which the committee does not give some facts. The conclusions reached are as follows.

It is obviously impossible to make this report a complete text book. Its aim has been to present a few suggestive examples leading logically to certain conclusions. Summarized, these are:

Progress in forestry depends more on what the public will permit than upon foresters and lumbermen.

Consequently public education is of primary importance.

Education is a matter of publicity and publicity is a trade in itself. It can not be practised intuitively.

Since no one else has the interest or the requisite forestry knowledge, foresters and lumbermen must learn this trade.

It is not forests, but the use of forests, that we seek to pertetuate. Therefore, to be sound and convincing, educational publicity must include the lumber business. So long as the public believes forestry good and lumbering bad there will be confusion and no real progress.

STATE FOREST POLICY

APPRECIATING the widespread desire to know how to frame, pass and enforce proper State forest laws, the committee on State Forest Policy, which is to report to the Fifth National Conservation Congress, decided to go into the subject at length, and their report will be found of unusual value in every State where at present there is no adequate forest law, and in other States where groups of interested people desire to have such laws passed but do not know just how to go about it.

There will likely be such a demand for this report, owing to the many pertinent suggestions it contains, that the American Forestry Association will be glad to provide copies of it in the future whenever such copies may be of assistance in framing and passing forestry legislation.

The committee says that the established principles in framing a law naturally fall under three headings: the principles on which a forest law should be based; the principles determining the form of organization, and the principles determining the effectiveness of the law and organization.

The State is interested in all forests, public and private, and the committee declares, should have a voice in the handling of even private forests lands, because the forest is a limited natural resource which must be cared for and maintained continuously for the public welfare and because the individual has but a passing interest in it.

The first basic principle of forest law, says the committee, is forest protection, protection from fire is of chief importance, and second comes protection from attacks of insect and fungi, while other phases of forestry work, protective in a certain sense, can be grouped under the head of maintenance of timber supply.

The second principle is to establish a timber supply on a permanent basis, and in regard to this the committee recommends that the governing body be removed from direct responsibility to political parties; that Civil Service rules be enforced; that there also should be representation of groups of industries directly and indirectly concerned with forestry; that proper provision be made for an executive head who is fitted for the place by both training and experience. This executive head should have provision for ample discretionary power; for delegating discretionary power, for establishing an efficient field organization and for settling controversies as a part of the administrative work.

The committee classifies the principles for determining the effectiveness of the organization as an adequate fund, and efficient force; prompt and effective penal provisions and proper police power.

Perhaps the greatest interest taken by the public in the report will be centered in the section which treats of the methods of passing a forest law—and it applies to other laws also—as outlined by the committee. The fact that the committee is composed of men who have had years of practical experience in

WILLIAM T. COX, ST. PAUL, MINN.

State Forester, and the Chairman of the Sub-Committee on State Forest Policy of the Fifth National Conservation Congress.

this kind of work lends particular weight to what they say. These men are William T. Cox, State Forester of Minnesota; F. A. Elliott, State Forester, of Oregon; C. R. Pettis, State Forester, of New York; H. H. Chapman, of the Yale Forestry Department Faculty; and J. E. Rhodes, of Chicago, Secretary of the National Lumber Manufacturers Association.

Regarding methods of securing the passage of State forest laws the committee says:

PASSING A FOREST LAW

Everybody is interested one way or another in forestry. Despite this fact, it is not an easy matter to get a legislature to enact good forest laws. In a State where there is much forest there will be a lumbering industry. Through the representation coming from lumbering districts a great deal can be accomplished, for they want the timber protected from fire. Legislators representing farming districts are interested in tree planting, and from that viewpoint may be induced to favor a comprehensive forest law. Sportsmen generally understand the importance of the forest in serving as game cover, and may be counted upon to lend their aid toward proper conservation of forests through

enacting a suitable law. Women's Federation Clubs and similar organizations. and all who have or want summer homes by wooded lakes, are natural friends of good forestry bills and may be enlisted in efforts to get proper legislative action.

In conducting a campaign looking toward the passage of any forest law, the first essential is the proper advertising of the proposed legislation, setting forth in detail the results it proposes to obtain.

As all laws are passed with a definite object in view, it is natural that any law pertaining to forestry will emanate from some person or persons who are

H. H. CHAPMAN.

Professor, Yale Forest School, New Haven, Conn.; a director of the American Forestry Association, and member of the Sub-Committee on State Forest Policy of the Fifth National Conservation Congress.

C. R. PETTIS, ALBANY, N. Y.

Superintendent of New York State Forests, and member of the Sub-Committee on State Forest Policy of the Fifth National Conservation Congress.

interested in the preservation of the forests. This interest may be for different reasons, and this fact must be borne in mind and the several viewpoints given careful consideration.

The preparation of a forestry bill or any part of it should be performed by a committee composed, if possible, of the various interests affected, if such a bill should become a law. Therefore, the first step, and a very important one, should be to call a meeting of interested persons and appoint from their number a live executive committee. Too much care cannot be given to the appointment of such a committee, as upon it will fall the framing, advertising and the representation before legislative committees of the desired legislation.

There should, if possible, be represented on this excutive committee, foresters, agriculturists, lumbermen, railroad officials and sportsmen, all of whom have a direct interest in their particular line in the preservation of the forests.

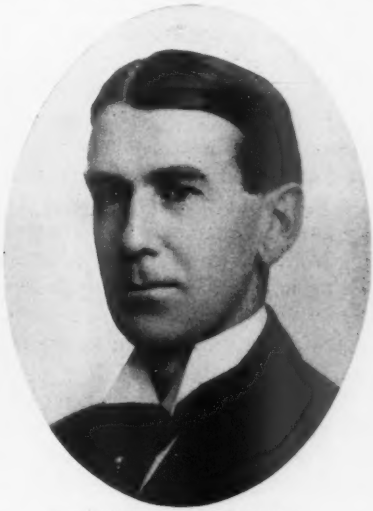
Expert legal talent, the favorable expression of the press and the public, and the services of some person or persons familiar with legislative committee work, will all be necessary to secure the passage of a forest law.

Before any proposed law is given publicity, its constitutionality should be given careful consideration. The principles which the law is to follow and the form of expressing these principles and methods to make them effective should be in quite definite form before presentation to the public.

The power of the press, and the encouragement and formation of associations

F. A. ELLIOTT, SALEM, OREG.

State Forester of Oregon, and member of the Sub-Committee on State Forest Policy of the Fifth National Conservation Congress.



J. E. RHODES, CHICAGO, ILL.

Secretary-Manager, National Lumber Manufacturers' Association, a director of the American Forestry Association, and member of the Sub-Committee on State Forest Policy of the Fifth National Conservation Congress.

and societies whose object is the furtherance of a forest conservation policy, are factors that are of the highest importance and should be used to their fullest extent.

Carefully written articles appearing in the newspapers will tend not only to give publicity, but will also call forth an expression of opinion which may be favorable or the reverse. Such an expression will show better, perhaps, than any other way, just how public opinion stands with regard to the proposed law. A classified list of individuals interested in one phase or another of forestry, provides a means of getting results from direct appeals to them. There is no better means for gauging the public sentiment and keeping its active support.

In the compilation of any article or pamphlet pertaining to the desired legislation, the writer should endeavor to cover his subject in all its phases. The fact that our lumber industry would be in some measure affected, would immediately arouse the interest of lumbermen. Sportsmen should be considered, as they

realize better, perhaps, than any one else, the importance of a forest cover for the perpetuation of a game and fish supply. Women's clubs and similar organizations, and all who have or want summer homes by forest-sheltered lakes, are natural friends of good forestry bills, and they are always willing to do all they can to secure proper legislative action.

The existence of a State forestry association or similar organization, offers an excellent opportunity to place the proposed legislation before the public and the legislators. The efforts of such an organization need not be confined to meetings or conventions only, but should be enlarged to cover such work as the issuance of a magazine devoted to forestry. If this forestry association is affiliated to some other society, numerically stronger, and arrangements are made for dual membership, a commensurate amount of support will be gained.

In some States, sportsmen have founded what are known as Game Protective Associations, whose members, apart from the excitement of the hunt, are seeking the forests and streams for relaxation from business worries. These clubmen, as a rule, are broad-minded, and their support can always be depended on when any good forestry measures are pending.

In States where a Forest Service is already in operation, the personnel comprising it will affect new legislation to a marked degree. It is not intended to convey that their political associations will be responsible for this, but rather the results they have obtained by the forest law, the provisions of which it has been their duty to enforce.

Advantage should be taken of any special days usually set aside by proclamation of the governor, such as Arbor and Fire Prevention Days. The issuance on these days of topical literature is advisable. This might take the form of pamphlets and be distributed in the schools. To reach the parents through the school children is one way, and a mighty convincing one, of getting the information where you need it.

After all this preparatory work has been performed, the actual presentation and discussion of the bill by the legislative committees is in order.

In all States, there is bound to be a majority of the members of the legislature representing districts which will be directly affected by the proposed law. It should, therefore, be an easy matter to secure their attention, and, provided the measures proposed are right, their support.

The presentation of actual facts and figures to legislators is necessary, if the desired law lends itself to that kind of demonstration. This matter should be handled by one whom, for the want of a better name, we shall call a "lobbyist." He must be prepared to debate the measure, and must be thoroughly posted on forest statistics, if the bill is purely forestry, and, if prairie protection with a view to reforestation or the promotion of woodlots is contemplated, he must also be in a position to explain the requirements in that direction. The introduction of statements by disinterested enthusiasts who might be recruited from such organizations as game protective associations will carry much weight.

When the bill is to come before the legislature, it is a wise provision to circulate information among the members, so that each and every one can be acquainted

with the purposes of it. Having progressed thus far with the proposed law, it is up to the law-makers to do the rest, and, almost invariably, if the publicity and information work has been well done, the results are favorable.

THE FEDERAL FOREST POLICY

ADDITIONAL national legislation including more liberal appropriations for protecting the national forests from fire is one of the chief recommendations in the report of the sub-committee on Federal Forest Policy, to be made to the Fifth National Conservation Congress. It is pointed out that more roads, trails and telephone lines should be constructed, that there should be more far reaching cooperation for fire protection with the States; that lands now outside of the national forests and suitable only for timber production should be placed under a competent administration. In addition to this emphasis is laid upon the necessity for cooperation with cities and towns in protecting municipal watersheds, and the extension of the fire protective service to include the national parks.

The report is strongly in opposition to State control of the forests. Past performances by the States which indicate the inability to properly administer State forests are quoted and the conclusion is drawn that State control has, in most cases, been rapidly substituted for private ownership and exploitation.

It is stated by the committee that citizens of the States are appealing, not to the States, but to the National Government, to recreate the forests.

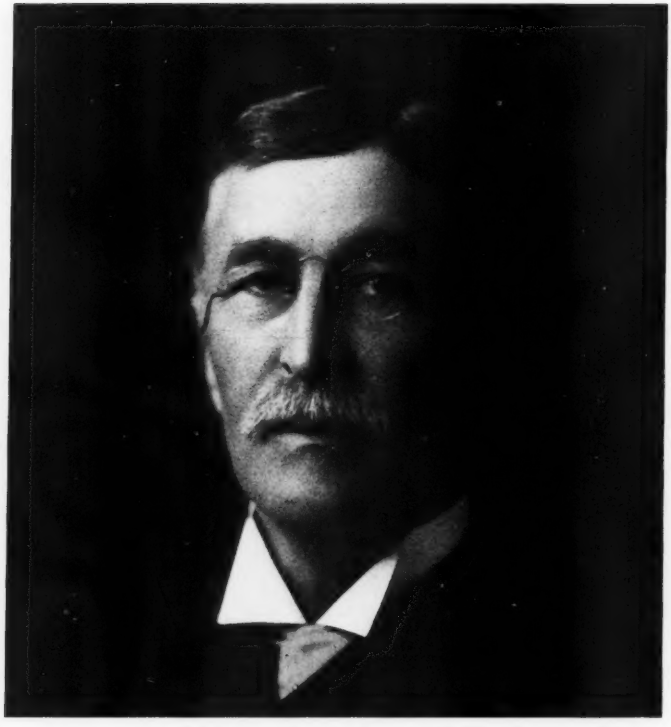
This committee is composed of Chairman Joseph N. Teal, of Portland, Ore., a well-known conservationist; Hon. A. F. Lever, chairman of the Agricultural Committee of the House of Representatives; Robert P. Bass, former Governor of New Hampshire; E. G. Griggs, a prominent lumberman and timber land owner, of Tacoma, Wash.; and F. E. Olmstead, a prominent forest engineer of Boston, who is soon to be located in California.

The Sub-committee on Federal Forest Policy considers in the first section the Needed Legislation in National Forestry. It is pointed out that Congress has already recognized the essential principles in the administration of public forest lands. The present needs are for an extension of these principles and the necessary executive authority to put them into practice. One of the urgent needs is more liberal appropriations for preventing the destruction of the national forests by fire, by the construction of roads, trails, telephone lines and other improvements.

Another measure which has materially reduced the fire damage is Federal appropriations for cooperation with the States, and the continuation of such appropriations is urged.

Outside of the national forests are considerable areas suitable only for timber production, and legislation which would put these lands under competent administration is advocated.

Authority under which the Forest Service may grant term permits for the occupancy of land for special uses, legislation permitting cooperation with cities



JOSEPH N. TEAL, PORTLAND, OREG.

Chairman of the Oregon Conservation Commission, and Chairman of the Sub-Committee on Federal Forest Policy of the Fifth National Conservation Congress.

and towns in the sanitary protection of municipal watersheds within national forests, and the extension of the fire protective service on the national forests to include national parks are additional legislative measures advocated.

Section 2, on National vs. State control of public forests, outlines the advantages of Federal control of public forests, and points out the fallacy of the arguments for State administration. That the forest laws are constitutional and that the authority exercised by the Department of Agriculture is legal, are proved by references to decisions of the Supreme Court. The criticisms made are usually not of the law but of its administration and the prejudices existing are not substantiated by the facts.

The ability of the States to act as administrators of public forest lands is open to serious doubt on the record of past performances. As yet there have appeared absolutely no concrete suggestions of a proposed State policy.

Enormous areas of land have been granted to all the public land States and it is an indisputable truth that not one of these States has appreciated the heritage bestowed or shown ability to protect it. The chief purpose has seemed to get rid of the public land at any price, with the result that Sate control has

rapidly been substituted for private ownership and exploitation, at inadequate return to the State.

The actual record of several States in the matter of public land administration is given in detail, and furnishes proof that the States have neither the organization, the policy, nor the funds to properly control public forest lands. Moreover, it would be impossible to develop uniform policies under separate control.

The expense of administration alone, and the one item of fighting forest

E. G. GRIGGS, TACOMA, WASH.

President, St. Paul and Tacoma Lumber Co., Vice-president, the American Forestry Association, and member of the Sub-Committee on Federal Forest Policy of the Fifth National Conservation Congress.

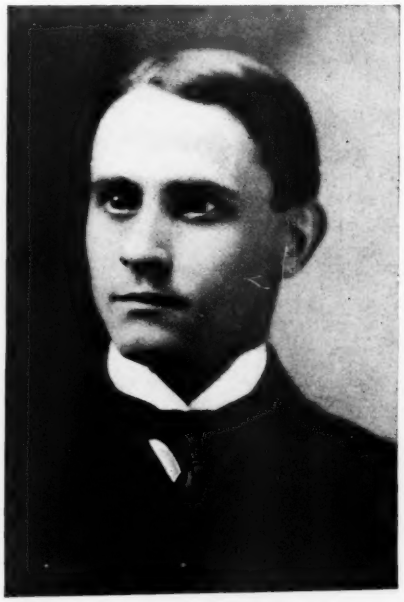
FREDERICK E. OLMSTED, BOSTON, MASS.

A well-known counsulting forester and a member of the Sub-Committee on Federal Forest Policy of the Fifth National Conservation Congress.

fires, would prove an insurmountable obstacle to effective State management of the national forests. The argument that the loss in taxes to the State by reason of Federal control is a sound argument for State control is shown to be a fallacy. The taxation value of most of the national forest timber is low, and the perpetual income the State will receive from the sale of stumpage must far exceed any amount that could be received from taxes, since under Federal administration the States receive 35% of the gross proceeds of the national forests. The assertion that Federal control of the national forests is a hindrance to settlement, mining, and waterpower development is not substantiated by the facts. The truth is that the agricultural lands within the forests are being restored for settlement as fast as they can be classified; while homesteading within the national forests is possible under the present laws. The same is true of mining and waterpower, and any honest development is encouraged. The classification

of lands within the national forests, which is now proceeding steadily, will obviate many of the difficulties and criticisms of the past.

Confirmation is given to the statement that once public ownership is surrendered the three great resources of the forest,—timber, water and forage—are rapidly monopolized for private advantage. After the results of private ownership become apparent, the people appeal to the National Government for help. They do not then appeal to their own State to recreate the forests, but the appeal is made to the Federal Government to appropriate the money to restore that which should never have been destroyed.



HON A. F. LEVER, LEXINGTON, S. C.

Chairman of the Committee on Agriculture, House of Representatives, a vice-president of the American Forestry Association and Member of the Sub-Committee on Federal Forest Policy of the Fifth National Conservation Congress.

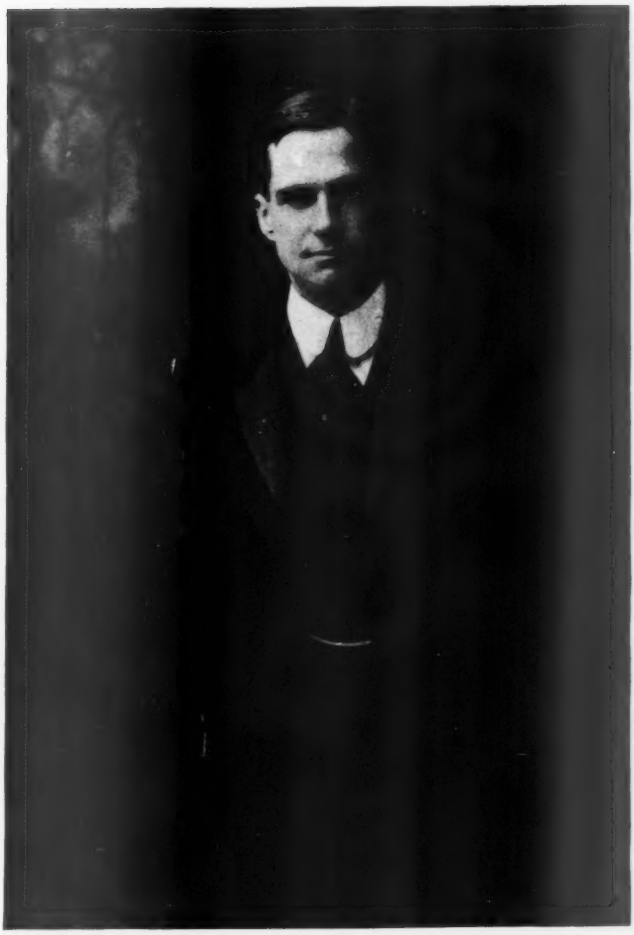
The settlement of these important questions will come from a full understanding of this difficult problem and by a fair compelling meeting with the Federal Government of constructive minds that are biased neither by dividends nor elections.

Section 3, on Economics of Timber Supply in Relation to Production and Consumption, was prepared by Mr. E. T. Allen, at the request of the sub-committee. The subject involves questions of policy somewhat embarrassing for joint discussion by the interests represented on the committees; hence it was believed best to assign the subject to Mr. Allen, as a disinterested authority.

The management of the standing timber on the national forests will inevitably affect profoundly the management of existing private and State holdings. It is obvious that no disposal policy which may be adopted by the Government can give universal satisfaction. The governmental perplexities in the crystallization of a forest policy will be greatly lessened when, as in older countries, a forest policy can be developed which involves the welfare of the whole people and protects with equal impartiality private as well as public interests.

It follows that the maximum cut from the national forests should be insured not during the existing period of stored and excessive virgin supply, or during that permanent future which will begin when adequate forest crops have had time to mature, but during the closing years of an intervening transition period.

Of immediate concern in the sale of timber from the national forests are, the questions as to whether there is too much or too little of the mature timber



HON. ROBERT P. BASS, PETERBORO, N. H.

Ex-Governor of New Hampshire ex-President of the American Forestry Association; member of the Sub-Committee on Federal Forest Policy of the Fifth National Conservation Congress.

being sold, and whether the prices charged too high or too low? Furthermore, there is the execution of the policies which are adopted, and whatever the criticisms, it is certain that few governmental branches have so general a reputation for sincerity and absolute integrity.

The consensus of opinion regarding the execution of the present system seems to be about as follows:

1. The administration of the national forest timber business is marked by sincerity and complete absence of graft or favoritism.

2. Purchasers testify that when the necessity arises they obtain a hearing, and differences are usually adjusted to mutual satisfaction.

3. There is sometimes too much delay and controversy over the preliminary negotiations, due both to the magnifying of inessential details and to the submission of such details to too many authorities.

4. The attempt to adjust prices to the profits of purchasers involves considerable investigation of a most difficult nature, subject at best to some theory and uncertainty.

5. This work is necessarily done sometimes by men lacking in practical lumbering experience, because government salaries do not attract experienced lumbermen and the service is not old enough to have developed the combined lumberman and forester in sufficient numbers. Higher salaries for such men would get and hold better ones.

6. Unreasonable public suspicion and danger of criticism for alleged collusion prevents the Forest Service from making full use of assistance, it might otherwise receive with practical problems, from unbiased sources within the lumber industry itself. Such cooperation might be as useful in this as it has proved to be in fire prevention.

7. The system of continued government control of operations under detailed contract places upon the subordinate officials directly in charge, a responsibility for requiring exact fulfilment to the letter when contingencies justify some deviation. This difficulty, also most of those in preliminary negotiations, would be reduced by increasing the authority of field men. There is a tendency to constant centralization of authority in Washington and perhaps in the district offices, whereas it should be constantly diffused all the way down the line as fast as local officers can be developed by so doing to take it increasingly.

8. On the whole, execution is improving with the age and development of the Service.

THE REMEDY

The Committee concludes its report by saying:

We have seen that the main objects of the Federal timber policy should be to:

1. Insure the consumer a maximum supply of timber at the critical time toward the end of the duration of the country's virgin forests, and before new crops take their place.

2. To exert a steadying influence on forest industry which will, on the one hand prevent monopoly and extortion, and on the other prevent over-production, demoralization of the industry, wasteful utilization, and wrecking of the small operator, all of which in the long run injure both the consumer and the States in which national forests are situated.

3. To make its terms for government timber attractive enough to permit use by those who really need it, but not to subsidize the transfer of lumbering generally to the national forests, leaving private timber uncut to control the situation when government timber is gone.

4. To secure as fair a revenue as is consistent with the above objects, but not to sacrifice them or future revenue unduly merely for a little more present gain.

5. To be as simple and understandable as possible to public, purchasers and congress.

To attain all these objects requires:

1. A non-partisan, unprejudiced, statesman-like treatment of the whole subject by all concerned, based upon knowledge of the conditions governing forest industry. These include the factors which govern prices, logging and manufacturing methods, the growth of forests and like influences which are too little comprehended by many who now seek to interfere.

2. A study of stands and conditions not only on the national forests but also on other forest lands, from which to judge future competitive relations.

3. Intelligent State action in encouraging conservative handling of private forests by wise tax and protective laws and in reforestation, and wise handling of their own lands by the States themselves.

4. The closest cooperation between government, States and private owners in all forest matters, bringing about friendly constructive effort in harmony, rather than conflict. The whole problem is an interlocking one, unsolvable by either agency alone.

5. A policy, based upon the above preparation, which considers all forest production and forest use as little or no different from the production and use of any other crop, to be encouraged and stabilized on the best permanent business basis for all concerned. The government should use its control of forest land profitably for its constituents for which it serves as steward, but without taking advantage of its position to accord either producer or consumer any unfair advantage. In the long run all have most to gain from making all true forest land, regardless of ownership, capable of earning such an income from forest production as will insure its best management and consequent fullest service to community and nation.

Under such a policy stumpage prices will continue to advance, because timber is becoming more valuable and because it costs money to carry it, will they reach the cost of growing timber, which is the true criterion of the value of any product, *but they will not pass it,* as they will if recklessness at this time results in bad use of so much forest area that the remainder acquires a monopolistic position. Under such a policy the terms of sale will be more clearly defined, with less left uncertain for future adjustment. It is probable that the problem of fixing fair prices in long term transactions will be largely met by improved transportation facilities, placing the timber open to competition by more purchasers and shortening the time necessary for them to open and use it, and where this does not result otherwise the government itself may provide such facilities. The competence of officials will naturally increase continually, through experience, unless Congress fails to provide adequate pay to hold them. States, Congress, and people will be equally satisfied with the national forests as a profitable public project.

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